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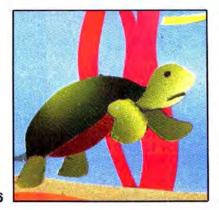




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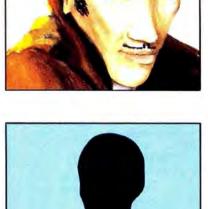
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Under The



FEATURES





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The small cassette tape symbols beside features and regular columns indicate that the program listings with those articles are on this month's RAINBOW ON TAPE, ready to CLOAD and RUN. For full details, check our RAINBOW ON TAPE ad on Page 149.

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NEXT MONTH: Get in touch with our Data Communications issue. Features will include remote driver and file-transfer communication programs, and for those involved with Ham radio, we'll have a program that determines your transmission line losses as well as entry log and QSL card generator. Wayne Day will return with his informative "CommLink" column and an up-to-date nationwide directory of bulletin board systems. Our RainbowTech section will have guest writers Bruce Warner, with a tutorial on getting started with the OS-9 operating system, and Brian Lantz, with the first of a two-part series on developing your own OS-9 utilities.

With our wide variety of games, utilities and product reviews, you can't "get the message" any better than with THE RAINBOW, the most complete source of information available anywhere for your CoCo!

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PRODUCT REVIEWS

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LETTERS TO THE RAINBOW

Endorsing Educational Software

Editor:

We love THE RAINBOW at our house. I am a teacher and since school has been out, I have been catching up on all of THE RAINBOWS. Our family purchased a CoCo for Christmas and what a terrific investment. We are still finding things the CoCo can do through your magazine. The CoCo without THE RAINBOW is just another computer.

I strongly urge you to have an educational software programming contest followed by another item to be added to "The Rainbow Bookshelf." At one time I had thought I would do my own programming, but there just aren't enough hours in the day to be a mother, homemaker and teacher, too. Therefore, I am looking more for programs to use in the high school classroom and home record keeping as a teacher.

Sheryl J. Smith York, PA

Thank You, Dr. Lee, Wherever You Are

Editor:

On June 5, I was in Miami, Fla., on business. While in a computer store inquiring about THE RAINBOW Magazine and video driver/monitor interfaces for the Color Computer 2, I met a gentleman who had all the answers. He volunteered to mail me a RAINBOW subscription form and an article about monitor interfacing. I received the letter he mailed, but the envelope accidentally ended up in the trash.

I've since found a copy of THE RAINBOW ... in Keflavik, Iceland. I want very much to thank this gentleman, but I remember neither his name nor address (Dr. Lee is the best I can do).

There are not many people who will help someone with no motive other than just being "good people." I envy his friends. Thank you.

Robert Austin Melbourne, FL

INFORMATION PLEASE

Editor:

I would like to hear from anyone who has built the hardware project "Wireless Joysticks" (Page 105, June 1985 RAINBOW) like the one built by J.O. Shaver. If so, please write to me at P.O. Box 3841, 30721.

Randall Rhudy Dalton, GA

Sending out an SMS

Editor:

I am unhappy and frustrated with Musica 2 because I cannot utilize the program's full potential. I purchased the program when Speech Systems was claiming Musica 2 would work with any printer: a claim they no longer make. When I try to print music from Musica 2 to my C. Itoh 8510A Prowriter printer, all I get is garbage.

Richard Parry, Speech Systems owner, tried unsuccessfully for several weeks to solve the problem, even going as far as to do some modification programming on *Musica 2* to eliminate the problem. I am still unable to print music on my printer. Mr. Parry also sent me a free copy of the new version of *Musica 2* just hours after it became available. While I appreciate the gesture, I would still like to be able to print music from *Musica 2* on my Prowriter printer.

Therefore, I am sending a desperate SMS (Save My Sanity) signal to all fellow Color Computerists who also own an 8510A Prowriter printer and *Musica 2*. Can anyone throw me a life line and come to my aid? I would really appreciate any help that would solve this dilemma, as I am going down for the third time. Please write to me at 2813 Sunnydale Drive, 49085.

William T. Grace St. Joseph, MI

HINTS AND TIPS

Editor:

One day you turn on the old CoCo and get the usual logo on the screen. You sit down and prepare yourself for a few hours of enjoyment and go to enter a command on the screen, then . . . panic stations! No matter what you do, nothing will enter on the screen. No line numbers, no list command, no directory command, nothing — just the cursor on the screen.

In a wild panic you check all the electrical connections — all tight and plugged in. All connections to the printer, tape deck, disk drive, etc. — all tight and plugged in.

You shut the machine off and on . . . nothing. You even disconnect the disk drive (after shutting the machine off, of course) and even the printer, to no avail. Still only the logo!

"Oh, no! Not a chip!" you wail in horror, "not a long down time, not now!"

Well, this of course happened to me and I suspect probably to some of you, too. Luckily, in my case, it wasn't a chip but a foolish error on my part: I had inadvertently left the joystick plugged in the night before.

Normally, this would make no difference, but this time it had gotten buried under the mess of papers and reference books that seem to grow around the machine, and the firebutton had gotten jammed against one of the books and was depressed.

When this happens, the computer will not accept any keyboard input at all (at least not the new 64K version).

Try it. Hold the firebutton down and try to type something. Hope this saves some readers an unnecessary service call or unwanted anxiety. You can be sure I unplug my joysticks after use now.

Richard F. Bellizz Victoria, British Columbia

Dusting Up

Editor:

Quite by accident, I discovered that the cover of the 15-Cassette Storage Tray (Radio Shack #44-665) makes a perfect keyboard dust cover for my CoCo 2. Thus, for the same price as the Radio Shack Dust Cover, I now have a cover plus storage space for my favorite cassette software. Hope this will be of use to some of your readers.

Ross Whitney Kitchener, Ontario

How to Hear the Silence

Editor:

I have an idea that may interest fellow RAINBOW ON TAPE users. Did you ever have to CLOAD five or six times to load a program, only to get an I/O Error each time because you couldn't find the silence between programs? You might end up rewinding the tape and searching from the start to load a program 100 counter units ahead! Each tape comes with a counter directory which is very useful, but it can be several units

If you're not successful after one or two attempts, try this: type AUDIDON and then ENTER. Disconnect the REM (remote) plug from the cassette deck and rewind the tape to five or six counter units before the start of the program you want to load. Now, when you press Play you will hear the electronic sounds of the previous program coming over your TV speaker. As soon as you hear the silence at the end of that program, stop the tape, reconnect the REM plug and type AUDIDOFF. Now you have found the silence between programs and you'll have no trouble CLOADing your program.

Rich Dextraze New Haven, CT

Editor's Note: Thanks, Rich. A method we use a lot, and which doesn't require unplugging the cable is to type MOTORON: AUDIOON and ENTER. This starts the recorder and lets us listen in. As soon as it reaches a blank spot, we hit any key and ENTER, thus causing a deliberate syntax error which stops the recorder and cancels the AUDIO command. Then, we type CLOAD and ENTER.

Food for the Adventurer's Appetite

Editor:

First, I want to tell you how much I enjoy your magazine. It has taught me a whole lot about the CoCo. Please continue to [publish] such interesting articles.

What I am wondering about is when will the Second Rainbow Book of Adventures be offered to us, the Adventure fanatics? I have been waiting ever since I solved the last Adventure in your First Book of Adventures. I hope the second book will be out soon.

Nathan Fisher Ponchatoula, LA Editor's Note: The Second Rainbow Book of Adventures is now available. See Page 258.

BOUQUETS

Editor:

I am a custodian engineer for the New York City Public School System. I have a need for various types of software, the best of which has been my payroll program that I purchased from Howard Medical Computers. I did this after purchasing other payroll programs only to find they were hard to use or would not do the things I was led to believe they would.

The real mistake was not subscribing to your great magazine two years ago. I purchased my current payroll program (from Howard Medical Computers) after reading your review of it. I have been using it for four months and had only one problem with it. That was when New York state changed their withholding rates on July 1, 1985. I called Howard Medical Computers in Chicago expecting to be told I would have to purchase a new program. I was told by the company representative I would receive a reply as soon as possible. To my surprise and delight, I received the new tax table on a diskette with instructions on how to copy it to the original program diskette. The best part is that it was free of charge.

I have never been so pleased with a piece of software or a software manufacturer before. I would recommend to any of your readers contemplating buying a payroll program for their business that they give Howard Medical Computers a try. I am sure they will enjoy using it as much as I do.

Thomas J. Malanga, Jr. Bayside, NY

Editor:

I would like to express my appreciation to the people at Speech Systems. I ordered EARS, Super Voice and their triple Y-cable, and everything got to my house within a two-week period. I never thought the CoCo would be one of the first computers to use an electronic audio recognition system device (EARS) and have one of the highest quality speech synthesizers made, but thanks to Speech Systems, the Color Computer is gaining on some of the best computers made today!

Again, I thank Speech Systems for the great job they are doing and I can hardly wait for their next project.

Blake Jurgensen Charleston, SC

Hello Again

Editor:

I don't usually write letters, but I wanted to tell you I enjoy the magazine and RAINBOW ON TAPE! Also, a special thanks

to Doug Heyza for writing *Hello*, the directory helper in the August 1985 RAINBOW [Page 69]. I've put it on all my disks and the performance is outstanding!

I'll bet it's exactly what John E. Beal of Boise, Id. ["Earth To Ed," Page 92] was looking for in his letter in the same issue. Thanks again. Please try to include a database or two for a 64K system with disk drive in future issues.

Gene Carpenter Cropwell, AL

SPECIFIC PROGRAM SEARCH

Editor:

I was wondering if you, or perhaps your readers, may be able to help me. I am looking for a computer check list or task manager program for my 64K CoCo. In planning two major conventions and over 300 smaller meetings a year, we are constantly involved in hundreds of steps and it's all too easy to forget a deadline for mailing back a hotel room cutoff list or sending promotion copy to the printer, etc.

I am hoping for a program that could print tasks or activities in ascending or descending order, generate each person's daily, weekly or monthly responsibilities, highlight and store completed and uncompleted tasks, etc.

If anyone knows if, or where, such a program can be obtained, please write me at 38 Boileau Court, 21769.

Gary J. Heimes Middletown, MD

Editor:

I am wondering if any company carries a pinball Simulation for the CoCo (other than Radio Shack's *Radio Ball*). I have a 64K CoCo with a disk drive. Send any information to P.O. Box 41, 45306.

Larry Wick Botkins, OH

Caveat Emptor

Editor

In your August 1985 issue, a number of readers mentioned problems with the United Color Computer Club. The following is a letter I have sent them regarding their new member tape. Also, it took two letters to them, after sending my check, to receive the tape. Caveat emptor to all CoCoers.

Jay M. Brown Hamden, CT

United Color Computer Club 10117 S.W. 53 Court Ft. Lauderdale, FL 33328

October 1985

Gentlemen:

After sending you a two-year membership check of \$50 in March and then having to remind you in June that no information was received, I finally, yesterday, received your newsletter and new member's tape.

After such a long wait, one would have expected a product worthy of what you'd call a "Worldwide Color Computer Club.'

Of the 21 programs on the tape, six contain FC, IO, SN, FM, etc. Errors. One would expect some written instructions — none included.

Your original advertisement letter promised free software - yet your new member letter asks for a \$10 handling charge and your regular newsletter requests \$6 — this is not what I consider truth in advertising, or even free!

Your original ad claims a club library with "probably the largest collection of public domain programs available — free," yet your newsletter states you do not have a complete list of your library.

I have dealt with a number of CoCo clubs, but yours is the only one that fails to live up to its advertising, therefore, please terminate my membership and refund the \$50 sent. Upon receipt of your check and it clearing my bank, I will return the new member's tape.

> Very truly, Jay M. Brown

BULLETIN BOARD SYSTEMS

In the March 1985 "Letters to Rainbow," the numbers for my BBS and my home phone number were somehow reversed. The real number for the CoCo Pub BBS is (602) 899-1350. There is an answering machine on the other number that announces the correction.

The Pub has been completely redecorated into BASIC09. It runs on a CoCo 1, Multipak, RS-232 pak and PBJ Word-Pak II and PCpak. The disk system is three 80-track, double-sided TEACs and a J&M Systems controller.

We support two message bases (public and private), personal mail and several download directories (Text, CoCo BASIC and OS-9). The line editor is unique; it is written to be similar to the CoCo EDIT command and supports 80-column by 50line posts.

Please stop by the Pub real soon. If you want, send your name, address, phone and a password to me at this address: 125 S.

Dobson, #1047, 85224.

Stephen Roberson Chandler, AZ

Editor:

Are there any BBSs in the Honesdale-Carbondale-Forest City-Scranton area in Pennsylvania?

Andrew Robinson Pleasant Mt., PA

Editor's Note: Please check Wayne Day's monthly column "Comm-Link" for new listings of BBSs. See our Communications issue, November 1984, Page 66, for a listing of BBSs in your area. Wayne's annual update will be next month.

Editor:

I would like to announce a new BBS. It's online 24 hours a day, seven days a week. The BBS is open to the general public and offers not only items of local interest, but items useful to all CoCo users. A special invitation is extended to those who may have an interest in using the CoCo in amateur radio or digital communications. The phone number is (205) 649-2894.

> Terry W. Platt Mobile, AL

Editor:

Please add our BBS to your list. Orange County Color America, 10112 Melody Park Drive, Data (714) 534-5174; 300/1200; Voice (714) 638-7889.

Fred K. Wright Garden Grove, CA

Editor:

I would like to announce the existence of a modified Colorama; the name of this BBS is the Undersea Kingdom of Goldens Bridge. It's been up and running since January 1985 and has the following features: uploads, downloads, seven plus stories, magazine, tell me, sand writings and krash this BBS. We have almost one meg of memory and we are running 24 hours, seven days a week at 300 Baud. Call us now and check it out - (914) 232-4582.

Michael Sebar Goldens Bridge, NY

Editor:

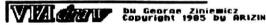
I am pleased to announce that a new Colorama BBS is now online. The number is (401) 765-2890. It features downloading,



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James S. Williams Woonsocket, RI

Editor:

The DLOAD OS-9 BBS is online and available seven nights a week from 9 p.m. to 9 a.m. We have E-Mail, bulletins, graphics and, best of all, downloads. We support OS-9, BASIC09, the Model 100, C. and regular Disk Extended BASIC. The BBS has three DS 40TK drives and is running under OS-9. New users may logon at the logon prompt by hitting the ENTER key. Once on, you can leave a message to the SysOp in the Mail section to become a permanent member. Phone (803) 288-0613. Your terminal package must be able to send eight data bits and one stop bit or the BBS will not respond to your requests.

Jim Taylor Greensville, SC

Editor:

The San Antonio Color Board is now active and in full operation 24 hours a day, seven days a week. We support program upload and download, message service, classified ads, text files, peeks and pokes, programming tricks and advice, product reviews, hardware and software purchase discounts from several sources and much more. We are operating a modified CoCo 2 with dual 80-track disk drives. We operate at either 300 or 1200 Baud. The protocol is automatically adjusted to your terminal. Call BBS (512) 674-0264; Voice (512) 674-4294

James Leatherman San Antonio, TX

Editor:

I would like to inform the CoCo users of the world about a new BBS. It is located in Crowsnest Pass, Alberta. The system is called "Wes-Can Color Board." It will be operational 24 hours a day, except for upkeep time. All users are welcome. We have a download section and mail; all the usual features. Give us a call at (403) 564-4118

Ted Kyle Blairmore, Alberta

Sydney, Australia

Editor:

I am writing to let you know of a group of dedicated people in the North shore area of Sydney who call themselves "The North Shore CoCo User Group." This group has now been going for almost two years. Among our members are a number of avid OS-9 users. This BBS is online on Tuesday and Thursday evenings between 19.30 and 21.30. The times will be extended as demand warrants and the service is free to all OS-9 devotees. The phone number is 02-451-2954. Callers can leave their name, address and phone number on the "note" board and they will be called back with their password. Graeme Nichols PEN PALS

Editor:

If anyone is interested in having a CoCo pen pal please write to me at 27 Cedar Road, 06913.

> Jim Partridge Clinton, CT

Editor:

I am planning on moving to Germany in January of 1986. I would be interested in meeting other CoCo/Dragon users who live in Europe. Anyone interested can contact me up until January 15, 1986, at 2708 Pinewood Drive, 20601.

Chris Ahrendt Waldorf, MD

Editor:

Would anybody like to be pen pals or start a pen pal club? I'm 12 years old, own a 64K CoCo and would enjoy any letters Write to me at 210 Tareyton Drive, 14850.

Zachary Perlman Ithaca, NY

Editor:

If there is anybody who would like to have a pen pal please contact me. I am 12 years old, I have a cassette recorder and a CoCo 2. Write to me at 5860 Lanc-Kirk Road, 43105.

> Jimmy Dayton Baltimore, OH

Editor:

I want to thank you for printing my letter in the April 1985 issue of RAINBOW. I got so many wonderful letters. I answered them all and have made some really good friends.

The only thing I would like to know is, don't women use computers? I didn't hear from one woman! Is there any way to find women home computer fans who use Color Computers (64K with tapes)? My address is 115-2nd Drive S.E., 44663.

Sandra Steed New Philadelphia, OH

Editor:

I am desperately looking for some CoCos in east Texas. If you live near or in the Lufkin area, or just want a pen pal, please write me! Since I moved from Houston to Broaddus (population 225), I haven't talked to another Color Computer owner. The best thing that happens out here is when THE RAINBOW comes each month! Write to me at P.O. Box 258, 75929.

> Allen Huffman Broaddus, TX

Editor:

I am looking for a computer pen pal. My address is Route 6, Box 293, 26505

Doug Wilburn Morgantown, WV

Editor:

I am always looking for pen pals, so if you are interested in the Color Computer then drop me a line to 6071 Park Avenue, H2V 4H4.

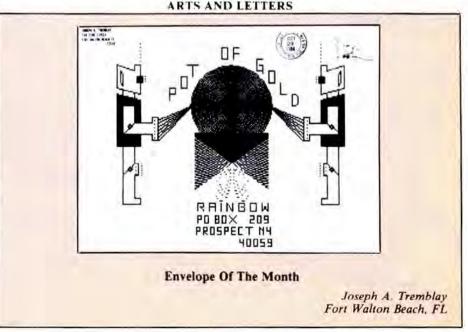
> Steve Glezakos Montreal, Quebec

Editor:

I am writing to you to ask for a pen pal in any state of the U.S.A. I have been buying your magazine in Australia for the last six months. I have come to realize that you have hetter programmers over there, so I would like to be in touch with some of them

Peter Mayer 5/246 William Street Kingsgrove, N.S.W. Australia, 2208

THE RAINBOW welcomes letters to the editors. Mail should be addressed to: Letters to Rainbow, The Falsoft Building, P.O. Box 385, Prospect, KY 40059. Letters should include the writer's full name and address. Letters may be edited for purposes of clarity or space.



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CHILD WRITER, our elementary word processor, is currently being used in schools by second grade children with amazing ease. Teachers tell us that kids are fascinated with the total control they have with a mouse. Just point and click! And we incorporated click-down menus to eliminate having to memorize dozens of commands. Simple instructions are right there on the screen, but only when you want them. Click the menu in when you need help and click it out when you don't. CHILD WRITER is not only easy to use, it's more fun and powerful.

Does your word processor underline text on the screen? All of the CHILD'S PLAY word processor programs do. For the first time you can reproduce on paper exactly what you've created on the screen. It's neat!

We could have stopped developing when we completed CHILD WRITER, but we knew that someone always wants more. So we developed MEMO WRITER, designed for the home user. And soon, we will have BUSINESS WRITER, the ultimate word processor designed for MOUSE professional use.

easy, so much fun for everyone to use, it's like CHILD'S PLAY. FORMAT CLICK HOUSE TO ERS OR HORDS CHILD WRITER ON-SCREEN UNDERLINING. 1 80014TC-4TCE or 3011963-3848 CLICK MOUSE TO TROM DISK CHILD WRITER'S MAIN MENU. Gaithersburg, MD 20879 2477

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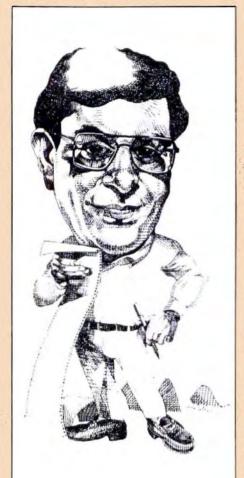
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bout three years ago, give or take a few months, a fellow by the name of Wayne Green figuratively "shot himself in the foot" by predicting the Color Computer was "dead" and would be discontinued by Radio Shack. That article was accompanied by many pious suggestions for Tandy personnel on how to make the CoCo's successor survive.

Is there a "Peterborough Plague" that inflicts residents of that picturesque New Hampshire hamlet every three years or so? It seems so to read the latest from Michael Nadeau, who despite being editorin-chief of a magazine that supports our CoCo, states flatly "The fact is that most people don't need computers, and the computer industry has failed to come up with a good reason for consumers to buy one."

Nadeau's column, "Digressions," also includes suggestions for Tandy Corp. He concludes "It really is no wonder that the home-computer market is dead in the water."

Michael uses the same word - "dead" - and makes the same mistakes as did Wayne, who was founder and publisher of 80 Micro.

Gee, Michael, I don't know what you are using your home computer for (unless you're trying to raise turkeys or something), but I have a

whole lot of uses for mine and keep finding new ones, too.

You make light of checkbook balancing programs, but I keep mine balanced with my home computer. Also, I have a lot of books, and I have a really nice database set up with my CoCo to keep track of where they all are. And, my daughter went from a 'C' to an 'A' in French in one six-week period just by using a little program I wrote myself on the Color Computer.

THE RAINBOW gets literally dozens of program submissions each week. Usually these are programs people have written to use at home. In short, Michael, I think you, just like Wayne did several years ago, have sold

the CoCo and other home computers short.

I remember that I was putting out a pretty brash little newsletter when the "Peterborough Plague" first struck and I wrote an editorial suggesting to Wayne that if he didn't like the CoCo, he should leave it alone. He did for a time, but then apparently saw the error of his ways and ended up starting a magazine to support it.

A lot of people never forgave Wayne Green for declaring the Color Computer to be dead. More than that, I wonder whether people should be in the Color Computer-supporting business if they don't believe in

the product in the first place.

Granted, there are slower sales for CoCo right now, but we see new software coming from Tandy and from third-party sources as well. We see an excellent computer system in place. We see a new CoCo on the horizon that will run circles around the competition. And yes, we see our own business as good and the CoCo market as a strong and healthy

Here at THE RAINBOW, we like the Color Computer just fine.

Ever since the first issue of THE RAINBOW was published, I have sent a complimentary copy to my mother in Birmingham, Ala. For everyone who has ever sent anything you did to your mother, I am sure without exception, the critiques have ranged from "wonderful" to "absolutely wonderful."

Mom is 78 and every once in a while she will call when she is particularly

Telewriter-64 the Color Computer Word Processor

- 3 display formats: 51/64/85 columns × 24 lines
- True lower case characters
- User-friendly full-screen editor
- Right justification
- Easy hyphenation
- Drives any printer
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THE ORIGINAL

Simply stated, Telewriter is the most powerful word processor you can buy for the TRS-80 Color Computer. The original Telewriter has received rave reviews in every major Color Computer and TRS-80 magazine, as well as enthusiastic praise from thousands of satisfied owners. And rightly so.

The standard Color Computer display of 32 characters by 16 lines without lower case is simply inadequate for serious word processing. The checkerboard letters and tiny lines give you no feel for how your writing looks or reads. Telewriter gives the Color Computer a 51 column by 24 line screen display with true lower case characters. So a Telewriter screen looks like a printed page, with a good chunk of text on screen at one time. In fact, more on screen text than you'd get with Apple II, Atari, TI, Vic or TRS-80 Model III.

On top of that, the sophisticated Telewriter full-screen editor is so simple to use, it makes writing fun. With single-letter mnemonic commands, and menu-driven I/O and formatting, Telewriter surpasses all others for user friendliness and pure power.

Telewriter's chain printing feature means that the size of your text is never limited by the amount of memory you have, and Telewriter's advanced cassette handler gives you a powerful word processor without the major additional cost of a disk.

...one of the best programs for the Color Computer I have seen...

- Color Computer News, Jan. 1982

TELEWRITER-64

But now we've added more power to Telewriter. Not just bells and whistles, but major features that give you total control over your writing. We call this new supercharged version Telewriter-64. For two reasons.

64K COMPATIBLE

Telewriter-64 runs fully in any Color Computer — 16K, 32K, or 64K, with or without Extended Basic, with disk or cassette or both. It automatically configures itself to take optimum advantage of all available memory. That means that when you upgrade your memory, the Telewriter-64 text buffer grows accordingly. In a 64K cassette based system, for example, you get about 40K of memory to store text. So you don't need disk or FLEX to put all your 64K to work immediately.

64 COLUMNS (AND 85!)

Besides the original 51 column screen, Telewriter-64 now gives you 2 additional high-density displays: 64×24 and $85 \times 24!!$ Both high density modes provide all the standard Telewriter editing capabilities, and you can switch instantly to any of the 3 formats with a single control key command.

The 51×24 display is clear and crisp on the screen. The two high density modes are more crowded and less easily readable, but they are perfect for showing you the exact layout of your printed page, all on the screen at one time. Compare this with cumbersome "windows" that show you only fragments at a time and don't even allow editing.

RIGHT JUSTIFICATION & HYPHENATION

One outstanding advantage of the full-width screen display is that you can now set the screen width to match the width of your printed page, so that "what you see is what you get." This makes exact alignment of columns possible and it makes hyphenation simple.

Since short lines are the reason for the large spaces often found in standard right justified text, and since hyphenation is the most effective way to climinate short lines,

Telewriter-64 can now promise you some of the

Telewriter-64 can now promise you some of the best looking right justification you can get on the Color Computer.

FEATURES & SPECIFICATIONS:

Printing and formatting: Drives any printer (LPVII/VIII, DMP-100/200, Epson, Okidata, Centronics, NEC, C. Itoh, Smith-Corona, Terminet, etc).

Embedded control codes give full dynamic access to intelligent printer features like: underlining, subscript, superscript, variable font and type size, dotgraphics, etc.

Dynamic (embedded) format controls for: top, bottom, and left margins; line length, lines per page, line spacing, new page, change page numbering, conditional new page, enable/disable justification.

Menu-driven control of these parameters, as well as: pause at page bottom, page numbering, baud rate (so you can run your printer at top speed), and Fpson font. "Typewriter" feature sends typed lines directly to your printer, and Direct mode sends control codes right from the keyboard. Special Epson driver simplifies use with MX-80.

Supports single and multi-line headers and automatic centering. Print or save all or any section of the text buffer. Chain print any number of files from cassette or disk.

RAINBOW CERTIFICATION File and I/O Features: ASCII format files — create and edit BASIC, Assembly, Pascal, and C programs, Smart Terminal files (for uploading or downloading), even text files from other word processors. Compatible with spelling checkers (like Spell 'n Fix).

Cassette verify command for sure saves. Cassette autoretry means you type a load command only once no matter where you are in the tape.

Read in, save, partial save, and append files with disk and/or cassette. For disk: print directory with free space to screen or printer, kill and rename files, set default drive. Easily customized to the number of drives in the system.

Editing features: Fast, full-screen editor with wordwrap, block copy, block move, block delete, line delete, global search and replace (or delete), wild card search, fast auto-repeat cursor, fast scrolling, cursor up, down, right, left, begin line, end line, top of text, bottom of text; page forward, page backward, align text, tabs, choice of buff or green background, complete error protection, line counter, word counter, space left, current file name, default drive in effect, set line length on screen.

Insert or delete text anywhere on the screen without changing "modes." This fast "free-form" editor provides maximum ease of use. Everything you do appears immediately on the screen in front of you. Commands require only a single key or a single key plus CLEAR.

...truly a state of the art word processor...
outstanding in every respect.

- The RAINBOW, Jan. 1982

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impressed with an issue to say: "I really don't understand all this computer stuff, but this is really a wonderful magazine. And, your Uncle Herb in Baltimore thinks so, too."

Mom has saved just about everything I've ever written. Which, considering all the time I've spent writing things, is quite a lot of stuff. But, in all that time, *she's* never written anything (except letters) — until now.

Mom's first journalistic effort is reproduced below. I know it doesn't apply to anything having to do with THE RAINBOW, the CoCo or computers. But, she's my Mom and it's her "first" article ever.

It is obviously a vignette from another time. Hey, Mom, it took you 78 years, but welcome to the profession of journalism. Not a badly done debut!

PAGE 7

I REMEMBER

September 5, 1929, was no doubt a memorable day for me. But then, the occasion of one's marriage holds special meaning. It is my wedding ceremony that remains significant as well as the circumstances of the day.

This was an unusually hot, muggy September and of course in those days air conditioners were non-existant. The heat pressed hard and my parents wornied about the reception guests. In order to make the balknoom bearable, the hotel placed buckets of ice around the entire dance floor with fans behind to blow the cold air. Quite a sight, not to mention the noise of the whirring fans. Some Champagne would have eased the situation, however, due to prohibition none was available in such an establishment. Thus, to calm my nerves, my delightful new husband sneaked me out the hotel kitchen into a limosine and it the closest speakeasy in Harrisburg, Pennsylvania.

Oh, such memories

Mrs. mildered C. Field

TUNE IN ROSEBELLE'S HEARING AID FOR NEWS THE SENIORS MADE

WILL APPEAR AGAIN NEXT MONTH

Reprinted from the August 1985 Futures Unlimited, senior adult newsletter.

One of the neatest pieces of productivity software we've seen is a program called *Desk Mate*, which is bundled with the Tandy 1000 and has been an instant hit. Watch for Tandy to soon offer a version of this outstanding program for the CoCo, too.

To me, it is just another example of Radio Shack's commitment to the CoCo. Desk Mate is a combination of a spreadsheet, word processor, telecommunications program, daily appointment calendar and other tools.

You should be able to see it up close and personal at RAINBOWfest in Princeton, N.J., Oct. 11-13. Which reminds me, I hope you are planning to be with us for this great show. We're really excited about it, and especially about the acceptance by Bill Barden to be our CoCo Community Breakfast speaker.

Bill, as you know, is one of the biggest names in the computer world and he will be our special guest all during RAINBOWfest. This is really an extra bonus and I hope you'll take advantage of it.

Breakfast tickets, though, are limited. It isn't hype when I urge you to order now. I fully expect a sell-out.

- Lonnie Falk



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BUILDING OCTOBER'S RAINBOW

Pyramid Pow(d)er . . .

The RainbowTech Disk . . .

Nearing the Billion-Page Mark . . .

ince this is, after all, a "building" column, let's discuss the latest building theory. I came upon it in the June Reader's Digest. It seems a scientist now claims that the pyramids may have been built out of concrete! I kid you not; that's what he says and, so far, I haven't heard anything about his being disproved.

Concrete! Give me a break. If chemist Joseph Davidovits of Barry University in Miami Shores, Fla., turns out to be right, he should get a handsome award, but the rest of the geologists and archaeologists who've pondered the "riddle of the centuries" should turn in their pith helmets — or be ridden out of town on a rail. Scientific hint: Look for some initials in the corners of the blocks, guys.

Legions of slaves heaving countless six-ton limestone slabs, indeed. It may turn out that the oldest of the so-called seven wonders of the world was built using a team of camels pulling a ready-mix wagon. Davidovits believes the pyramid builders filled wooden molds with a slurry of crushed limestone mixed with a mineral binder. In fact, this theory may explain why the pyramid stones are filled with tiny air bubbles not found in the quarry from which they reportedly came. Don't ask me why the high priests of the scientific temples can't tell man-made poured cement from natural rock, but I can't say I'm not surprised, because I am. This shakes up some old foundations, including my belief in science as a science.

If this cement theory holds together, move over Piltdown Man, because this guy may have uncovered the Hoax of the Ages. Stretching across the centuries for a segue, I'd like some concrete ideas from you readers on how to solve a problem that seems to be pyramiding here at THE RAINBOW. You see, we're considering something I've tentatively dubbed the *RainbowTech Disk*, a new service, and we'd like to do it right the first time.

Often, we get letters asking why we don't put assembly language source code on RAINBOW ON TAPE. The most recent plea comes from Jacques Labonte of Acton Vale, Quebec. He makes a good case for providing source code on magnetic media. I agree that there's a need, but I don't think RAINBOW ON TAPE is the vehicle. Of the thousands who avail themselves of this service each month, too many are rank beginners who would pull their hair out trying to CLOAD and RUN source code. No, they need the assembled, running binary file — only. There's more to it than that, though.

Others are asking regularly when we are going to offer OS-9 programs ready to load and run. Can't do that on tape, can you? At least, not readily. Besides that, still others want templates for spreadsheets and database managers, and the growing following of "CoCo Gallery" wants these picture data files ready to load in and view, but many of these are very long and useful only to those who have the programs to load them. So, there is a wide variety of programming material — some I haven't even mentioned we need to package in some convenient way.

Enter the Rainbow Tech Disk, a sort of high-tech service for specialized interests, a diversified magnetic assemblage of computer odds and ends. How to do it? Well, we have a couple of avenues for getting both OS-9 and Disk BASIC files all on the same disk, without even flipping the floppy, but then maybe you know a better way. Also, is this something you'd like to have? And, what else would you want on this "hard-core hackers" service? Let us hear from you; at this point, nothing is carved in stone.

To this brief treatise, my usual footnote: Join the legions of RAINBOW subscribers and we'll order our scribes to parcel out, just for you, a special monthly ration of the almost 300,000,000 pages we print annually — almost a billion pages since we launched a four-page newsletter in June 1981.

- Jim Reed

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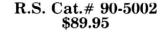
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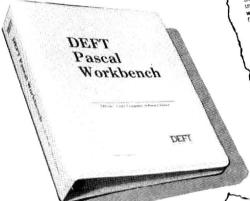


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HOT CoCo Magazine - (March 1985)

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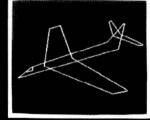
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Graphics Quickies

Drawing the Line By Jimmy McGill

The following is a Lo-Res line drawing program. Simply use the arrow keys to move up, down, left and right; use the number keys '1' through '8' to select the desired color ('0' will switch to black).

The listing: LINEDRAW

1Ø CLS(Ø)

15 A=31

17 B=15

2Ø A\$=INKEY\$

3Ø IF AS=""THEN GOTO 2Ø

50 REM DIRECTIONS

51 IF A\$=CHR\$(94) THEN B=B-1:IF B

<Ø THEN B=Ø

52 IF A\$=CHR\$(1Ø)THEN B=B+1:IF B

>31 THEN B=31

53 IF A\$=CHR\$(8) THEN A=A-1:IF A<

Ø THEN A=Ø

54 IF A\$=CHR\$(9) THEN A=A+1:IF A>

63 THEN A=63

6Ø REM COLORS

61 IF AS="1"THEN C=1

62 IF A\$="2"THEN C=2

63 IF A\$="3"THEN C=3

64 IF AS="4"THEN C=4

65 IF A\$="5"THEN C=5

66 IF A\$="6"THEN C=6

67 IF A\$="7"THEN C=7

68 IF A\$="8"THEN C=8

69 IF A\$="Ø"THEN GOSUB 1ØØ

7Ø SET(A,B,C)

8Ø GOTO 2Ø

100 RESET(A,B):GOTO 20

Read My Lips! By Bill Bernico

The following program is a graphics display of a fellow named "KoKo" (sound familiar?) who will "spit out" sentences from the user's input information. The fascinating part of the program is the way the information is presented.

For ambitious programmers who would like to substitute different sentences, the programming techniques used are listed below.

Line	Description
80-150	Accepts user input and assigns to variables
170-200	Draws KoKo
210	Allows 20 spaces before the printing begins
220	Holds the framework of the sentence and variables from the user input
240	Creates the sound and prints at 256, the sentences created in Line 220



The listing: SPEAKZME

10 'SPEAK TO ME

16K ECB

20 'BY BILL BERNICO 3Ø '7Ø8 MICHIGAN AVE. 4ø 'SHEBOYGAN, WI 53Ø81 5ø '(414) 459-735ø 6Ø 7Ø CLEAR 1ØØØ 8Ø CLS:PRINT"WHAT IS YOUR NAME": INPUT N\$ 9Ø CLS 100 CLS:PRINT"HOW OLD ARE YOU":I NPUT XS 11Ø CLS:PRINT"ARE YOU A BOY OR G IRL": INPUT" (B/G) "; BG\$ 120 IF BG\$="B"THEN BG\$="BOY"ELSE IF BG\$="G"THEN BG\$="GIRL"ELSE BG \$="PERSON" 13Ø CLS:PRINT"WHAT STREET DO YOU LIVE ON": INPUT Z\$ 14Ø CLS:PRINT"WHAT CITY DO YOU L IVE IN": INPUT CT\$ 15Ø CLS:PRINT"WHAT STATE IS THAT IN": INPUT ST\$ 16Ø B\$=CHR\$(128):Y\$=CHR\$(159):E\$ =CHR\$(157)17Ø CLS:PRINT@51,STRING\$(8,128): PRINT@82,STRING\$(10,128):PRINT@1 13,STRING\$(12,128):PRINT@146,Y\$; Y\$;Y\$;STRING\$(8,128) 18Ø PRINT@178,;Y\$;E\$;Y\$B\$;B\$;Y\$; STRING\$(5,128):PRINT@2Ø9,STRING\$ (8,159);STRING\$(4,128) 190 PRINT@242, STRING\$ (10, 159): PR INT@275,STRING\$(9,159):PRINT@3Ø6

200 PRINT@402,STRING\$(11,255):PR INT@433,STRING\$(13,175):PRINT@46 5,STRING\$(13,255):PRINT@496,STRI NG\$(15,175);

STRING\$(9,159):PRINT@34Ø,STRING

\$(7,159):PRINT@372,STRING\$(7,159)

21Ø FOR U=1 TO 2Ø:Q\$=Q\$+CHR\$(143):NEXT U

22Ø S\$="HELLO "+N\$+", MY NAME IS KOKO. I'LL BE VISITING "+Z\$+" S TREET WHEN I'M IN "+CT\$+" NEXT W EEK. I'M LOOKING FOR A "+BG\$+" A BOUT "+X\$+" YEARS OLD TO HELP ME FIND THE CAPITAL OF "+ST\$+"."

23Ø L\$=Q\$+S\$+Q\$

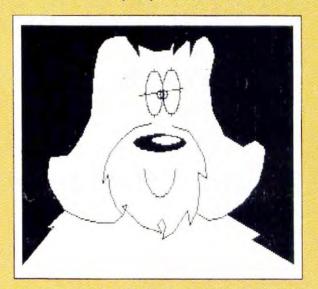
24ø FOR P=1 TO LEN(L\$)-19:SOUND RND(9)+18ø,2:PRINT@256,MID\$(L\$,P,19);:NEXT P 250 PRINT@481, "aNOTHER OR eND";

26Ø W\$=INKEY\$:IF W\$="A"THEN 1Ø E

LSE IF W\$="E"THEN 27Ø ELSE 26Ø

27Ø CLS:PRINT"BYE, ";N\$ 28Ø PRINT"SEE YA LATER

It's Charlie the Canadian Dog, Eh!



Charlie's picture can be dumped to a printer for color or black-and-white printouts using a screen dump program.

The listing: CHARLIE

16K ECB

10 'CHARLIE (C) COPYRIGHT 1985 R AY LARABIE ALL RIGHTS RESERVED 2Ø CLS:PRINT"CHARLIE (C) 1985 RA Y LARABIE": PRINT" ALL RIGHTS RE SERVED" 3Ø INPUT"BLACK & WHITE OR COLOR (B/C)";A\$ 4Ø IF A\$="C" THEN PMODE3,1:SCREE N1, Ø: PCLS2: GOTO7Ø 5Ø PMODE4,1:SCREEN1,1:PCLS1:COLO RØ,1 6Ø 'left ear 7Ø DRAW"BM111,24;M98,8;M89,8;M79 ,11;M72,19;M68,36;M65,71;M56,87; M49,96;M43,1Ø2;M28,1Ø3;M25,1Ø7;M 24,119;M27,128;M36,14Ø;M4Ø,145;M 56,152;M72,155;M87,155;M95,149" 80 'right ear 9Ø DRAW"BM159,24;M164,12;M172,8; M175,9;M18Ø,16;M182,24;M18Ø,32;M 177,44;M18Ø,67;M191,86;M2Ø8,95;M 22Ø,9Ø;M228,95;M229,99;M227,111;

M222,124;M2Ø8,139;M188,151;M176, 153;M165,148" 100 'brow 11Ø DRAW"BM111,24;M11Ø,15;M125,2 Ø;M14Ø,19;M144,11;M143,23;M156,1 1;M159,13;M159,24" 120 'snout 13Ø DRAW"BM122,77;M1Ø7,8Ø;M98,86 ;M91,92;M83,1ØØ;M78,111;M76,124; M81,117;M83,132;M89,143;M95,149; M99,141;M94,142;M112,157;M131,16 3;M128,156;M132,152;M135,158;M13 2,168;M142,163;M156,145;M158,157 ;M165,145;M167,131;M166,115;M174 ,12Ø;M172,1Ø4;M164,91 140 'shoulders & eyelashes 15Ø DRAW"M157,83;M142,79;BM4Ø,14 5;M22,16Ø;M3Ø,158;MØ,188;BM193,1 48;M225,164;M216,168;M255,187;BM 111,55;M152,49" 16Ø 'eyes 17Ø CIRCLE(125,53),9,,2.2:PAINT(125,49),1,4 18Ø CIRCLE(141,52),9,,2.2:PAINT(141,47),1,4 19Ø CIRCLE(131,54),4:CIRCLE(134, 54),4 200 'mouth 21Ø CIRCLE(13Ø,113),15,,1.5,Ø,.5 220 'nose 23Ø CIRCLE(136,9Ø),15,,.3:CIRCLE (13Ø,92),25,,.3:PAINT(13Ø,95),,Ø 240 IF A\$="C" THEN PAINT(\emptyset , \emptyset),3, 4 ELSE PAINT(Ø,Ø),Ø,Ø 25Ø 'end 26Ø FORX=255TO1STEP-1:Y=Y+1:POKE 14Ø, X: EXEC43345: POKE14Ø, Y: EXEC43 345: NEXTX: Y=Ø: GOTO26Ø

Title Page Power By Bill Bernico



One thing every program needs is an eye-catching title page. Kromico uses the DRAW and PAINT method that puts the title on the screen, paints the letters, switches to an alternate screen and starts over with another color, giving you a possibility of 24 different

screen presentations. Use the power of your CoCo to spruce up those title pages!

The listing: KROMICO

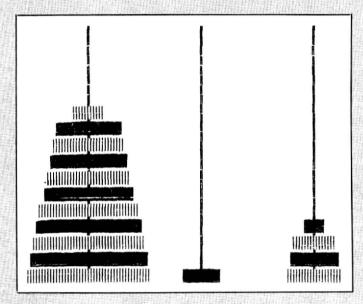
16K ECB

	ECB
1ø 'KROMICO	
20 'EXAMPLES OF GRAPHIC TI	TLES
3Ø 'BY BILL BERNICO	
4ø '7ø8 MICHIGAN AVE.	
5Ø 'SHEBOYGAN, WI 53Ø81	
6ø '(414) 459-735ø	
7ø ' '	
8Ø PMODE3,1:SCREEN1,1:PCLS	
9Ø X=1 'START PAINTING WIT	
R #1	
100 'LINES 110-240 DRAW AN	D PAIN
T "KROMICO" IN FAT LETTERS	
11Ø DRAW"BM2,1D7ØR12U25F25	
ØL2Ø9H25E35L16G25U25L11" '	
12Ø PAINT(6,7),X,4	
13Ø DRAW"BM4Ø,57U44R25F6D1	4G6L1Ø
F18L12H1ØD1ØL8BU38BR8R8F4D	
14" 'R	
14Ø PAINT(44,55),X,4	
15Ø DRAW"BM78,52U32E6R2ØF6	D32G6L
2ØH6BR1ØBU2UF3R8E3U25H3L9G	
'O	
16Ø PAINT(8Ø,52),X,4	
17Ø DRAW"BM118,57U42R1ØF8E	8R1ØD4
2L1ØU26G8H8D26L1Ø" 'M	
18Ø PAINT(12Ø,55),X,4	
19Ø DRAW"BM163,57U42R1ØD42	T.10" 1
I	
2ØØ PAINT(165,55),X,4	
21Ø DRAW"BM18Ø,46U23E7R2ØF	7061.811
3H3L11G3D22F3R11E3U3R8D6G6	T.21H6II
4" 'C	
22Ø PAINT(182,44),X,4	
23Ø DRAW"BM221,5ØU28E6R2ØF	6D28G6
L2ØH6BR1ØBU2UF3R8E3U21H3L9	
'0	
24Ø PAINT(224,52),X,4	
25Ø 'LINES 26Ø-33Ø DRAW "S	OFTWAR
E" IN SMALLER LETTERS (NO	PATNTT
NG)	
26Ø DRAW"BM75,8ØU2H2L4G2D4	FODAFO
D4G2L4H2U2" 'S	
27Ø DRAW"BR14D2F2R4E2U12H2	T.4G2D1
1" 10	
28Ø DRAW"BR16D3U9NR6U7R9"	16
29Ø DRAW"BR7R11L6D16U16BR1	
3ØØ DRAW"D12F4E4NU6F4E4U12	
7" 'W	DDIODK
31Ø DRAW"U12E5F6D5NL9D6" '	Δ
32Ø DRAW"BR6U16R6F2D4G2L6R	
'R	ZEODZ.
33Ø DRAW"BR6NR9U8NR6U8R9"	•
34Ø GOSUB44Ø 'TIME DELAY	
SEA LITTIES SEA LOG TON DIE	

350 'LINES 360-400 TRY DIFFERENT

SCREEN STYLES
36Ø PMODE4,1:SCREEN1,Ø:GOSUB44Ø
37Ø PMODE1,1:SCREEN1,1:GOSUB44Ø
38Ø PMODE4,1:SCREEN1,1:GOSUB44Ø
39Ø PMODE3,1:SCREEN1,Ø:GOSUB44Ø
4ØØ PMODE1,1:SCREEN1,Ø:GOSUB44Ø
41Ø X=X+1 'AFTER ALL 6 SCREEN ST
YLES ARE TRIED, PAINT WITH A DIF
FERENT COLOR
42Ø IF X>4THEN 8Ø 'REPEAT AFTER
ALL FOUR COLORS ARE TRIED
43Ø PMODE3,1:SCREEN1,1:PCLS:GOTO
11Ø 'ERASE SCREEN AND START OVER
44Ø FORT=1TO15ØØ:NEXTT:RETURN

The Towers of Hanoi By David Cromley



The following is a graphics demonstration of the "Towers of Hanoi" puzzle. The object is to move all the discs on the left rod over to the right rod in the same order that they were in at the beginning. This shows how the puzzle can be solved.

The listing: HANDI

16K ECB

100 '--TOWERS OF HANOI

110 ' D-C DAVID A CROMLEY, 1984

12Ø PCLEAR 4: PMODE 3,1: COLOR 3

, 2

13Ø PCLS: SCREEN 1,Ø

14Ø N=Ø8: NR=N: DIM TN(3), TS(3,1

6),TC(3,16)

15Ø FOR X=43 TO 213 STEP 85

16Ø LINE (X,Ø)-(X,191), PSET: NEX

TX

17Ø T1=2: T3=1: FOR I=1 TO N: TN

(2)=1

18Ø TS(2,1)=I: TC(2,1)=I-INT(I/3)

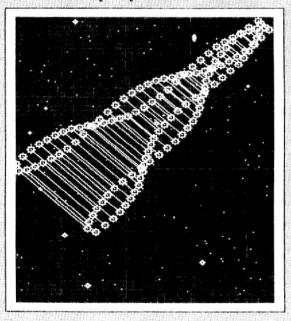
) *3+3

19Ø GOSUB 22Ø: NEXT I

200 T1=1: T2=2: T3=3: GOSUB 340 21Ø GOTO 21Ø 22Ø '--MOVE ONE DISC 23Ø N1=TN(T1): N3=TN(T3)+1 24Ø TN(T1)=N1-1: TN(T3)=N3 25Ø XS=TS(T1,N1): TS(T3,N3)=XS 260 XC=TC(T1,N1): TC(T3,N3)=XC27Ø X1=T1*85-42: X3=T3*85-42 28Ø Y1=194-N1*12: Y3=194-N3*12 29Ø XR=44-INT(XS/NR*19)*2 300 COLOR XC,2: FOR Y=0 TO 9 31Ø LINE (X1-42, Y1+Y) - (X1+42, Y1+ Y), PRESET 32Ø LINE (X3-XR, Y3+Y)-(X3+XR, Y3+ Y), PSET 33Ø PSET (X1,Y1+Y,3): NEXT Y: RE TURN 34Ø '--SUBROUTINE 35Ø IF N=Ø THEN RETURN 36Ø T=T2: T2=T3: T3=T: N=N-1: GO SUB 34Ø 37Ø T=T2: T2=T3: T3=T: GOSUB 22Ø 38Ø T=T1: T1=T2: T2=T: GOSUB 34Ø

Space Waves By Joey Goodson

39Ø T=T1: T1=T2: T2=T: N=N+1: RE



Reiresin draws sine wave designs on an outerspace background and plays a short sound effect. The design is erased and then starts over with a new picture. For quicker drawings, PDKE 65495,0.

The listing: RCIRCSIN

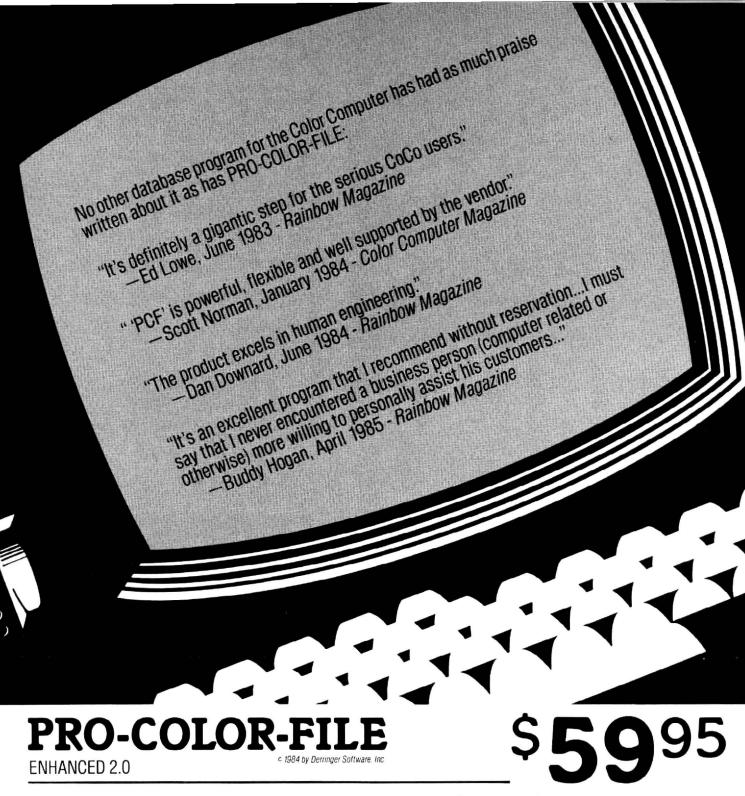
TURN

16K ECB

1 '*RCIRCSIN* - BY JOEY GOODSON

2 A=RND(-TIMER)

4 G=1Ø:R=3



The first serious database program available for the Color Disk System and, since its introduction in November 1982, it has remained the popular choice of the Color Computer user.

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won't be the same each time.

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Telegraphics interfaces with Radio Shack, Epson, Gemini. C-thoh and Okidata printers having dot-addressable graphics. A simple modification to Telewriter-64 will allow you to exit Telewriter via the DISK I/O MENU and print out the graphic without affecting any of your text in the buffer. This is the same feature that is included in our MASTER DESIGN program. Since we felt you don't need to buy two graphics editing programs, we have made this feature available at a reduced price.

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5 PMODE4,1:PCLS:SCREEN1,1 6 FORW=1T015Ø:PSET(RND(252),RND(191)):NEXTW:FORW=1TO1Ø:CIRCLE(RN D(255), RND(191)), RND(2): NEXTW 1Ø IFB=Ø THEN X=X+3 11 IFB=1 THEN X=X-3 12 IFBB=Ø THEN XX=XX+3 13 IFBB=1 THENXX=XX-3 14 G=G+GG 20 Y=G+10*(SIN(X)) 3Ø LINE(X,Y)-(Y,XX), PSET 31 CIRCLE(X,Y),R:CIRCLE(Y,XX),R 32 IFX=255 THENB=1 33 IFX=Ø THEN B=Ø 34 IFXX=192 THEN BB=1:GOSUB1ØØ:P CLS:R=RND(1Ø):FORW=1T015Ø:PSET(R ND(255), RND(191)): NEXTW: FORW=1TO 10:CIRCLE(RND(255),RND(191)),RND (2):NEXTW 36 IFXX=Ø THEN BB=Ø 37 IFG=248 THEN GG=-2 38 IFG=1Ø THEN GG=2 50 GOTO10 100 PLAY"V1" 101 J=RND(5):J\$="0"+STR\$(J):PLAY J\$ 110 FORJ=1T015 120 PLAY"T255V+ABGABG":NEXTJ 13Ø FORJ=1T015 14Ø PLAY"T255V-ABCDEFGABCDEFG":N EXTJ 15Ø FORJ=1TO46Ø:NEXTJ 16Ø J=RND(4):ONJ GOSUB 2ØØ,25Ø,3 ØØ,35Ø 161 RETURN 200 FORJY=0T0191:LINE(0,JY)-(255 ,JY), PRESET: NEXTJY: RETURN 25Ø FORJY=191TOØSTEP-1:LINE(Ø,JY)-(255,JY), PRESET: NEXTJY: RETURN $3\emptyset\emptyset$ FORJX= \emptyset TO255:LINE(JX, \emptyset)-(JX, 191), PRESET: NEXTJX: RETURN 35Ø FORJX=255TOØSTEP-1:LINE(JX,Ø)-(JX,191), PRESET: NEXTJX: RETURN

Speed Optimizing By Doug Farrell

Ball presents a stunning, visual graphics effect. Before loading and running **Ball**, enter the following pokes:

The listing: BALL

1Ø CLS6: PRINT@224, "CAN THE COMPU
TER WORK AT HIGH SPEED? (Y
/N)"

2Ø A\$=INKEY\$: IFA\$="Y"THENPOKE654
95, Ø:WA=4Ø:GOTO3ØELSEIFA\$="N"THE
NPOKE65494, Ø:WA=2Ø:GOTO3Ø:ELSEIF

A\$=""THEN2ØELSEGOTO2Ø 3Ø IN=1:S=1.33333333 4Ø R=-.39Ø625:Z=4ØØ:Z1=36ØØ 5Ø CLS4: PRINT@224, STRING\$ (32, 32) 6Ø PRINT@192,STRING\$(32,153); 7Ø PRINT@256, STRING\$ (32, 153); 8Ø A\$=" 1YOU WON'T BELIEVE THIS! !! 3PRETTY INCREDIBLE I MIGHT AD D 50K, OK, I'M WORKING ON IT!!! 7ALLRIGHT, GET READY, HERE IT IS 9Ø FORP=1T013STEP4 100 PMODE3, P:PCLS3:COLOR1, 1 11Ø M1=INSTR(A\$,STR\$(IN))+2 12Ø PRINT@224,MID\$(A\$,M1,INSTR(M 1,A\$,STR\$(IN+2))-M1) 13Ø FORL=ØTO256STEP64:LINE(L,191)-(128,96), PSET: NEXT 14Ø FORL=112T0189STEP8 15Ø L1=L+IN:L2=L1-96:I2=IN/4Ø:L2 =L1-96 17Ø LINE(257-L1*S,L1)-(L1*S,L1), PSET: LINE (257-L1*S, L1) - (257-L1*S ,L1-26+L2*R), PSET:LINE-(Ø,L1-26+ L2*R), PSET: LINE(L1*S, L1) -(L1*S, L1-26+L2*R), PSET: LINE-(255, L1-26+ L2*R), PSET 18Ø NEXT 19Ø COLOR1,1 200 LINE(0,80) - (255,80), PSET21Ø PMODEØ, P: PCLSØ: PMODE3, P: PAIN T(1Ø,78),1,1 22Ø COLOR1,1 23Ø LINE(Ø,127)-(128,7Ø),PSET:LI NE-(255, 127), PSET: LINE $(\emptyset, 8\emptyset)$ - (255,8Ø), PSET 24Ø FORX=58T0178STEP4 $250 Y=SQR(Z*(1-(X-118)^2/Z1))$ 260 LINE(X-2, 159-Y) - (X-2, 159+Y), PSET 27Ø NEXT 28Ø CIRCLE(128,96),6Ø,2:PAINT(12 8,38),2,2:CIRCLE(128,96),6Ø,1 29Ø FORA=.2TO1STEP.2 3ØØ CIRCLE(128,96),6Ø,1,A-I2,Ø,. 53 310 NEXT 32Ø FORA=ØTO.8STEP.2 33Ø CIRCLE(128,96),6Ø,1,A+I2,.5, 1 340 NEXTA 35Ø IN=IN+2 36Ø NEXTP 37Ø P=1 38Ø PMODE4, P:SCREEN1, 1 39Ø FORW=ØTO WA:NEXT 4ØØ P=P+4:IFP>13THENP=1 41Ø GOTO38Ø 9



This program helps make the 'ups and downs' of learning easy

2 3 4 1 5

ELEVATOR

By Bill Bernico

sesame Street teaches fundamentals to youngsters, helping them understand simple, everyday words like large or small, near or far, alike or different. Here's a program that helps them comprehend up and down.

This program, Elevator, at first glance, may appear to be strictly for young kids. Don't believe it! There are some pretty slick programming tricks integrated into this one — tricks you may want to use in your own programs even if you aren't overly entertained by an elevator making the rounds.

Constructing the seven floors of the building is done in lines 80-220, the building being topped off by the word "ELEVATOR" in Line 230. Lines 240-250 ask if the user wants to go up or down. Lines 260-290 accept user input. Line

(Bill Bernico is a self-taught computerist who enjoys golf, music and programming. He is a drummer with a rock band and lives in Sheboygan, Wis.) 270 keeps the words "GOING UP" on the screen and erases the "OR." Line 280 keeps the word "GOING" on the first line, erasing the rest of that line. It also keeps the word "DOWN" on the second line, erasing "(U/D)."

The basis of the elevator action is held in lines 300 through 420. Lines 300-350 are GUSUBed if the user chooses 'D' and lines 360-420 are GUSUBed if the user chooses 'U'.

In either case, 'S' equals the value of the sound, with the top floor having the highest sound. 'N' equals the number of the floor displayed in the right window and is poked into value 'V'. I used POKE instead of PRINT @ because PRINT @ left unwanted spaces before and after the number.

As the elevator passes each floor a character string that's half black and half yellow appears in the window, which gives the impression of the elevator being halfway

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velop 6809 software. You get trial assembly in memory, an editor to change your



program and Z-Bug for testing. #26-3250

Bingo Math.* Three exciting

games to make learning math fun. Bingo, Speed Math and Number Hunt. #26-3150



1995

Baseball.* This exciting game

plays like the big leagues! You are the coach-it's up to you to control the pitching, de-



fense, and running for extra excitement. Fast paced baseball action. #26-3095

Canyon Climber.* Your climb-

ing skills are tested when you find kicking goats, falling rocks, zinging arrows and



more on your way to the summit. #26-3089 **29**95 Downland.* You're alone in a

secret cave. you jump and climb from chamber to chamber collecting gold and dia-



monds. Each chamber is a new danger. Will you survive? #26-3046

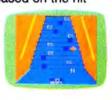
1995

Galactic Attack.* Enemy

spaceships bomb your defense shields. If you destroy this squadron, the

enemy reverts to a deadly night attack. #26-3066

Poltergeist. Based on the hit movie. Search for clues and face the poltergeist. Not for parents or others easily frightened. #26-3073



2495

1995



Joysticks required. ssette recorder required. Joysticks and recorder required.

the Color Computer **You Want**

Mega-Bug.* A maze of fun! Try

to lose the little "buggers" hot on your trail. You can't stop. Everywhere you go, on

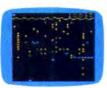


every turn, there's more of them! Excellent color graphics. #26-3076

19⁹⁵

Slay the Nerius.* Fast action is

needed to save your submarines from deadly starfish and the ancient sea creature



—Nerius. #26-3086

1995

Clowns and Balloons.* A real

circus act. Use your safety net to bounce the clown up and down to pop the balloons



overhead! Be careful—don't let the clown fall. #26-3087

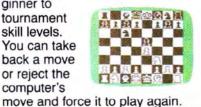


Deluxe Joystick. Get accurate cursor control and quicker response. Dual-axis trim controls. #26-3012

Joysticks. Two controls with full 360° movement! Single-shot button. A "must" for selected games. #26-3008 (pair)

Cyrus. A chess program with be-

ainner to tournament skill levels. You can take back a move or reject the computer's



7 Card Stud. Compete with

three computer poker players. They can adjust to your playing style and make it more difficult to win. #26-3000



1995



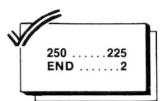


Prices apply at Radio Shack Computer Centers and at participating Radio Shack stores

between floors. I chose the variable BY\$ to represent the "Bottom Yellow" color block. TY\$ is used when the "Top Yellow" block appears.

from anyone who can use this (414) 459-7350.

These actions are merely premise and build a more comrepeated in a FOR/NEXT loop plex program around it. My until you've covered all seven address is 708 Michigan Avenue. floors. I'd be interested in hearing Sheboygan, WI 53081, phone



The listing: ELEVATOR

- 10 'ELEVATOR
- 2Ø 'BY BILL BERNICO
- 3Ø '7Ø8 MICHIGAN AVE.
- 4Ø 'SHEBOYGAN, WI 53Ø81
- 5Ø '(414) 459-735Ø
- 6Ø
- 7Ø L\$=CHR\$(128):A\$=STRING\$(1Ø,19 1):B\$=CHR\$(191):C\$=B\$+B\$+B\$+L\$:D
- \$=CHR\$(159):E\$=STRING\$(2,191):TY

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```
$=CHR$(156):BY$=CHR$(147)
8Ø CLS3:PRINT@498,A$;
9Ø PRINT@466,C$;C$;E$;
100 PRINT@434,A$;
11Ø PRINT@4Ø2,C$;C$;E$;
12Ø PRINT@37Ø,A$;
13Ø PRINT@338,C$;C$;E$;
14Ø PRINT@3Ø6,A$;
15Ø PRINT@274,C$;C$;E$;
16Ø PRINT@242,A$;
17Ø PRINT@21Ø,C$;C$E$;
18Ø PRINT@178,A$;
19Ø PRINT@146,C$;C$;E$;
2ØØ PRINT@114,A$;
21Ø PRINT@82,C$;C$;E$;
22Ø PRINT@5Ø,A$;
23Ø PRINT@18,B$; "elevator"; B$;
24Ø PRINT@Ø, "GOING UP OR";
25Ø PRINT@32,"DOWN (U/D)?";
26Ø I$=INKEY$:IFI$=""THEN26Ø
270 IF IS="U"THEN PRINT@8,"
:PRINT@32,STRING$(11,143);:GOSUB
28Ø IF I$="D"THEN PRINT@6,"
 ";:PRINT@37,"
                      ";:GOSUB 3Ø
29Ø GOTO 8Ø
3ØØ S=18Ø:N=55:V=1113:FOR Y=85 T
O 469 STEP 64
31Ø PRINT@Y, TY$;:GOSUB42Ø
32Ø PRINT@Y, D$;:SOUNDS, 1:POKEV, N
:GOSUB42Ø
33Ø PRINT@Y, BY$;:GOSUB42Ø
34Ø PRINT@Y,L$;:PRINT@Y+4,L$;:GO
SUB420
35Ø S=S-5:N=N-1:V=V+64:NEXTY:RET
URN
36Ø S=15Ø:N=49:V=1497:FOR Y=469
TO 85 STEP-64
37Ø PRINT@Y, BY$;:GOSUB42Ø
38Ø PRINT@Y,D$;:SOUNDS,1:POKEV,N
:GOSUB42Ø
39Ø PRINT@Y, TY$;:GOSUB42Ø
4ØØ PRINT@Y,L$;:PRINT@Y+4,L$;:GO
SUB42Ø
41Ø S=S+5:N=N+1:V=V-64:NEXT Y:RE
TURN
```

42Ø FORK=1TO2ØØ:NEXTK:RETURN

(A)

Uncomplicate Programming Tasks Using Your ROM Routines

By R. Bartly Betts Rainbow Contributing Editor

recall a saying I used to hear. The situation went like this:

If I wanted to borrow my friend's yoyo, I said, "Hey, Bryan, can I borrow your yoyo?"

He kindly replied, "Ah, go get your own, dummy."

I said, "Why buy a cow when you can milk one through the fence?"

He promptly hit me on the jawbone with his yoyo.

You Bought it with Your Computer

Well, there are a few things you can borrow from your computer, without endangering your jawbone. They are called ROM routines. Remember? I mentioned them in the August column.

A ROM routine is a machine language routine that resides in ROM. Actually, your computer's ROM (Read-Only Memory) is nothing but a series of machine language routines and tables. Some of the routines only operate as part of the BASIC ROM built into your computer, but other routines

(R. Bartly Betts is currently a technical writer for Tandy Corp. and is a former news reporter and magazine editor. As the father of 10 children, computers are his escape from reality.)

can be called from any program and put to use.

THE RAINBOW has carried numerous articles and listings dealing with ROM routines and I do not propose to compete with them. However, I have talked to a number of people who, after looking over the articles, still didn't know of what value they are or how to put them to use.

Along with ROM routines, your computer also contains some tables and values in a "work space" area of RAM that can also be borrowed and manipulated to make assembly language programming a bit easier. I will leave that discussion for the future.

Are ROM Routines Worthwhile?

Before encouraging you about ROM routines, I should mention that using them is not always the best policy. You may have experienced the frustration of having a program that works on one version of the Color Computer, but does not work properly on another version.

Often this is due to a change made in the ROM routines that the program attempts to directly access. Tandy, of course, does not guarantee it will leave ROM routines alone in new versions of BASIC. Thus, using them can create future problems for you or someone else.

A good example of this type of problem is found by attempting to use the *Telewriter* word processor with the JDOS disk controller. The JDOS controller contains its own Disk BASIC routines, and *Telewriter* relies heavily on using built-in Disk BASIC. It does not find what it is looking for in JDOS and, as a result, cannot function. A machine language program that is totally independent of ROM does not have this type of problem and could possibly operate on a totally different 6809-based computer.

Despite the problems involved in using ROM routines, it is still a fun way to program. There is something exciting about doing a complicated task with very little programming. For instance, there is a ROM routine available to clear the text screen and home the cursor. To use it, you need only one program line:

JSR \$A928

That's all. Routine \$A928 clears the screen and sends the cursor to the top left-hand corner of the screen. If you

wish to check this out from BASIC, type EXEC &HA928 and ENTER. It is more ENTER, but it does the job. From assembly language, however, such a routine is much less work than writing the code to do the job. For instance, the code to only clear the screen might look something like this:

	LDA	96
	LDX	\$#400
LOOP	STA	,X+
	CMPX	\$#600
	BEQ	DONE
	BRA	LOOP

Anytime six lines of code can be replaced with one it seems like a good process. However, the one-line program would never work in a 64K machine with BASIC ROM disabled. The six-line program possibly could.

If you like the idea of this kind of programming, I have included a few more routine addresses. Experiment with them. If you get some good results and find some good applications, let me know and I will share them with other readers.

A 3 3	D
Address	Purpose
\$A30A	Print the character repre-
	sented by the value in Reg-
	ister A to the screen.
\$A393	Input a line of text from
	the keyboard and store it in
	a buffer at memory loca-
	tion \$02DD.
\$A027	Reset your computer.
\$A2BF	Send the character repre-
	sented by the value in Reg-
	ister A to the printer.
\$A027	Initialize BASIC.
\$A9DE	Sample the joysticks and
	store the values in the fol-
	lowing locations:
	\$015A - up/down value of
	left joystick;
	\$015B - left/right value of
	left joystick;
	\$015C - up/down value of
	right joystick;
	\$015D - left/right value of
	right joystick.
\$BDCC	Display the decimal value
	The same of the sa

There are, of course, many other ROM routines. If there are some you especially like, send me a note and I will also share them with other readers.

of Register D.

The Son of Bytecoder

I was pleasantly surprised at the work than typing CLS and pressing interest in the Bytecoder program of some months back. If you remember, it is a BASIC program designed to allow you to examine and change memory locations. Its purpose is to let you enter a machine language program without the use of an editor/assembler. One of its features is the ability to save the machine language program once you have typed it.

> I have gotten a lot of letters and calls as a result of the program. Some wanted to say they enjoyed the program and found it useful (thank you very much), and others were having problems. Also, a couple of readers offered help and suggestions.

To Richard D. King of Houston, Texas, and Larry Geiger of Lawrence, Kan., I give thanks. Your suggestions and upgrades are appreciated and are included in my new version. For those who wanted some way to examine registers in BASIC, I have included the feature in the new version of Bytecoder. The interest in Bytecoder seemed keen enough that I decided to upgrade it and include all of your ideas and suggestions, your corrections and a few other goodies.

What it Does

Bytecoder now has three displays on the screen when you are entering or examining code. Instead of just the hexadecimal values of the memory locations being displayed, you also see the decimal values and the ASCII characters these values represent. If an ASCII value cannot be displayed on the screen (it is less than 32) then the display shows "XX."

I have included the decimal display for those who are still not familiar with hexadecimal. I have retained the requirement that the values you enter are in hexadecimal due to the fact that this is what most assembly language listings show.

I have included the ASCII characters to allow you to read any text located

Thanks to Mr. King, Bytecoder now adds an extension to the filename if you are using disk. It also provides a prompt that asks if you wish to save the program to tape or disk and then acts accordingly. As well, Mr. King included some lines to trap filenames that are too long or if you try to save a file without a filename.

Mr. Geiger provided the solution to the problem of wrong values being displayed if a number less than 16 is entered. The change is in Line 630 for those who have been trying to track it down vourselves.

As mentioned earlier, Bytecoder now lets you examine the registers from BASIC. The process is accomplished through a machine language program, but it is accessed by BASIC, so you need not leave the program to use the function.

Other changes are mostly cosmetic and have little bearing on how the program works. The new lines have been inserted between the old lines so you will have little difficulty in spotting them to add to the original program.

Putting it to Use

To use Bytecoder, after you have typed it in or loaded it from RAINBOW ON TAPE, type RUN and answer the starting address prompt with the hexadecimal address of where you wish to examine or change memory. The screen displays the contents' 24 bytes, beginning at the address you specify, in Hex, decimal and ASCII. A cursor appears over the first value. To change that value, type it in Hex. When you do, the screen display changes to show the new value.

If you do not wish to change the value, use the right- and left-arrow keys to move the cursor one byte at a time. To move the cursor eight bytes at a time (to the next row above or below), use the up- and down-arrow keys. Use the equals sign (=) or minus sign (-) key to move the display back 24 bytes, or the plus sign (+) or semi-colon (;) key to move the display ahead 24 bytes.

As you move through memory, the current memory location indicated by the cursor is displayed on the left upper corner of the screen. If you press 'R' to display the registers, they appear on the upper right of the screen in this order:

Register A Register B Register X Register Y Register U Condition Code register

To select a new starting address for the memory display, press 'N'.

To save a block of memory into a file (a machine language program),

press CLEAR and answer the prompts.

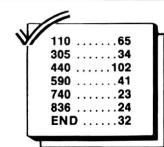
I have used the speed-up poke to make the display change faster. It is disabled when you save to tape or disk. If you do not wish to use the speedup poke, or if your machine doesn't like it, edit Line 100. The program runs quite satisfactorily without it.

I have tried to keep Bytecoder simple to use but gave it the features it needs.

I have included the complete code in Listing 1 because of the extensive changes that have been made.

As well, the assembly source code for the register display function is included as Listing 2. You may wish to put it to use in other programs. All that Listing 2 does is store the register values in memory locations \$7FF8 through \$7FFF. I then used PEEK to obtain the values, put them in a string and display them (see program lines 840 through 950). You must use CLEAR 1,&H7FE0 to protect the program and its values if you use it with a BASIC program.

(You may contact Mr. Betts with questions or suggestions at 2251 Lipscomb, Fort Worth, TX 76110, 817-924-3725. Please include an SASE when writing.)



Listing 1: BYTECODR

```
***************
1
2
       BYTEMASTER CODER
  ۱*
3
      BY R. BARTLY BETTS
        3351 LIPSCOMB
                          *
5
  1 *
      FORT WORTH,
                   TEXAS
  1 *
6
            7611Ø
  ***************
7
8
  'USE THIS PROGRAM TO INPUT
9
  'MACHINE LANGUAGE CODE INTO
  'MEMORY. USE THESE KEYS:
   '<N>=GET NEW START ADDRESS
11
12
  'RIGHT ARROW=AHEAD 1 BYTE
13 'LEFT ARROW=BACK 1 BYTE
14 'UP ARROW=BACK 8 BYTES
   'DOWN ARROW=AHEAD 8 BYTES
16 '<-> OR <=> = BACK 24 BYTES
  <+> OR <;> = AHEAD 24 BYTES
18 '<CLEAR> = PREPARE TO SAVE
19
   'THE NUMBER KEYS AND THE
2Ø 'ALPHABET CHARACTERS A - F
21 'CAUSE A VALUE BO BE PUT
22 'INTO MEMORY
23
24
100 CLS:CLEAR300,&H7FE0
1Ø5 GOSUB 95Ø
11Ø V=32
12Ø DIM M(24)
13Ø A$(1)="BYTEMASTER CODER"
14Ø A$(2)="R.BARTLY BETTS"
15Ø A$(3)="JANUARY 1985"
155 '
          SET UP SCREEN
156
          GET ADDRESS
16Ø FOR T=1 TO 3
17Ø PRINT TAB(16-LEN(A$(T))/2) A
$(T)
```

```
18Ø NEXT
19Ø GOSUB 79Ø
200 PRINT@V*12," START ADDRESS I
N HEX";
21Ø INPUT BG$
212 PRINT@V*12,STRING$(32,32)
22\emptyset B=VAL("&H"+BG$)
23Ø BB=B
24Ø FOR T=Ø TO 23
25Ø BB$=HEX$(PEEK(BB)):IF LEN(BB
$) < 2 THEN BB$="Ø"+BB$
252 PRINT@M(T),BB$;
253 D=D+1:PRINT@M(T)+128-2+D, PEE
K(BB);:IF D>7 THEN D=Ø
254 CR=PEEK(BB): IF CR>31 THEN PR
INT@M(T)+256, CHR$(CR) ELSE PRINT
@M(T) + 256, "XX
26Ø BB=BB+1
27Ø NEXT T
272 D=Ø
29Ø A$=CHR$(128):B$=CHR$(32)
3ØØ P=Ø
3Ø5 '
         KEYBOARD INPUT
3Ø6 '
         TO EXAMINE AND CHANGE
31Ø IF P>23 THEN P=Ø:B=B+24:GOTO
 23Ø
32Ø IF P<Ø THEN P=Ø:B=B-24:GOTO
23Ø
322 IF D>7 THEN D=Ø
33Ø M=M(P): C=PEEK(M+1Ø24):H$=""
34Ø PRINT@96, "*"HEX$(B+P)"*";
35Ø IF C>63 THEN G=C-64 ELSE G=C
+64
355 '
         WAIT FOR KEYPRESS
356 '
         AND PRODUCE CURSOR
36Ø K$=INKEY$:POKE M+1Ø24,G: IF
K$="" GOTO 36Ø
37Ø POKE M+1Ø24,C
375 '
         LOOK FOR VALID
376 '
         KEYPRESS
38Ø IF K$=CHR$(94) THEN P=P-8:GO
TO 31Ø
39Ø IF K$=CHR$(1Ø) THEN P=P+8:GO
TO 31Ø
4ØØ IF K$=CHR$(8) THEN P=P-1:D=D
-1:GOTO 31Ø
41Ø IF K$=CHR$(9) THEN P=P+1:D=D
```

October 1985

31

+1:GOTO 31Ø 42Ø IF K\$=CHR\$(12) THEN 66Ø 43Ø IF K\$="+" OR K\$=";" THEN B=B +P+24:GOTO 23Ø 44Ø IF K\$="-" OR K\$="=" THEN B=B +P-24:GOTO 23Ø 45Ø IF K\$="N" THEN RUN 452 IF K\$="R" THEN GOTO 84Ø 455 LOOK FOR INVALID 456 ' KEYPRESS 46Ø IF ASC(K\$)<48 OR ASC(K\$)>7Ø THEN 36Ø 47Ø IF ASC(K\$)>57 AND ASC(K\$)<65 THEN 36Ø 475 ' INCREMENT MEMORY IF END OF DISPLAY 476 ' 48Ø IF P<Ø THEN B=B-24:P=1:GOTO 23Ø 49Ø IF P>24 THEN B=B+24:P=1:GOTO 23Ø 495 ' PRINT TO SCREEN 496 ' AND GO TO NEXT CHAR 5ØØ PRINT@M,K\$; 51Ø H\$=H\$+K\$ 52Ø M=M+1 525 ' ROUTINE FOR SECOND 526 ' CHARACTER INPUT 53Ø C=PEEK(M+1Ø24) 54Ø IF C>63 THEN G=C-64 ELSE G=C

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	\$99.95 \$5.95 \$9.95 \$6.95 \$6.95	\$99.95 Optical Scanner \$5.95 Tempurature Sensor 2

For a free brochure listing all add-on modules with application hints call or write to: The Color Link Incorporated, PO Box 74B, Marissa IL 62257 ph. (618) 587-2441, Shipping and handling \$2.00. IL residence add 6.25% sales tax. +64 55Ø POKE M+1Ø24,G 56Ø K\$=INKEY\$:IF K\$="" THEN 56Ø 57 \emptyset IF ASC(K\$)<48 OR ASC(K\$)>7 \emptyset THEN 560 58Ø IF ASC(K\$)>57 AND ASC(K\$)<65 THEN 56Ø 59Ø POKE M+1Ø24, ASC(K\$)+64 595 ' ADD UP INPUT VALUES 596 AND POKE IN MEMORY 6ØØ H\$=H\$+K\$ 61Ø PK=VAL("&H"+H\$) 62Ø POKE B+P, PK 63Ø IF PK<16 THEN PRINT@M, HEX\$(P K); ELSE PRINT@M-1, HEX\$(PK); 632 D=D+1:PRINT@M+D-3+128,PK;:IF D>7 THEN D=Ø 634 PRINT@M+256-1, CHR\$(PK)" "; 64Ø P=P+1 65Ø GOTO 31Ø SAVE PROGRAM TO TAPE 655 ' 656 ' OR DISK ROUTINE 66Ø CLS 67Ø A\$(1)="BYTEMASTER CODER" 68Ø A\$(2)="========" 685 A\$(3)="SAVE PROGRAM" 686 POKE 65494,Ø 69Ø FOR T=1 TO 3 700 PRINT TAB(16-LEN(A\$(T))/2) A \$(T) 71Ø NEXT T 72Ø PRINT@V*4+2,"* START (HEX).. .";:INPUT BM\$:BM=VAL("&H"+BM\$) 73Ø PRINT@V*5+2,"* END (HEX) . . .";:INPUT EM\$:EM=VAL("&H"+EM\$) 74Ø PRINT@V*6+2,"* EXEC (HEX). ..";:INPUT EA\$:EA=VAL("&H"+EA\$) 75Ø PRINT "NAME OF PROGRAM...";: INPUT NP\$ 751 IF LEN(NP\$)<1 OR LEN(NP\$)>8 THEN 75Ø 752 PRINT: PRINT"TAPE OR DISK (T/ 753 K\$=INKEY\$:IF K\$="" THEN 753 754 IF K\$="D" THEN 760 ELSE IF K



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\$="T" THEN 77Ø ELSE 753



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76Ø NP\$=NP\$+"/BIN":SAVEM NP\$, BM, EM, EA 765 GOTO 78Ø 77Ø CSAVEM NP\$, BM, EM, EA 781 PRINT "ANY MORE PROGRAM TO B E INPUT (Y/N)?" 782 K\$=INKEY\$: IF K\$="" THEN 782 783 IF K\$="N" THEN 787 ELSE IF K \$<>"Y" THEN 782 784 RUN 1ØØ 787 END DATA FOR POSITION 788 ' 789 1 OF SCREEN DISPLAY 79Ø FOR X=16Ø TO 224 STEP 32 8ØØ FOR T=Ø TO 21 STEP 3 810 M(X/4-40+T/3)=X+T-3282Ø NEXT T,X 83Ø RETURN 835 **'** PROGRAM TO 836 ' READ REGISTERS 84Ø DEFUSR1=&H7FEØ $85\emptyset$ A=USR1(\emptyset) 86Ø R(1)=PEEK(&H7FF8):R\$(1)="a" 87Ø R(2)=PEEK(&H7FF9):R\$(2)="b" 88Ø R(3)=PEEK(&H7FFA):R\$(3)="x" 89Ø R(4)=PEEK(&H7FFD):R\$(4)="y" 900 R(5) = PEEK(&H7FFC) : R\$(5) = "u"

91Ø R(6)=PEEK(&H7FFF):R\$(6)="c" 92Ø CT=Ø:FOR T=57 TO 236 STEP 32 922 CT=CT+1 93Ø PRINT@T, R\$ (CT) "="R(CT); 94Ø NEXT T:GOTO 36Ø 945 ' DATA FOR REGISTER 946 ' READING PROGRAM 95Ø FOR T=Ø TO 21 96Ø READ AA 97Ø POKE &H7FEØ+T,AA 98Ø NEXT 99Ø RETURN 1ØØØ DATA 183, 127,248,247,127,2 49,191,127,250,255,127,252,16,19 1,127,253,31,168,183,127,255,57

Listing 2: Assembly Language Source Code for Register Display Routine

7FEØ			gg1gg	ORG	\$7FEØ
7FEØ	B7	7FF8	ØØ11Ø	STA	\$7FF8
7FE3	F7	7FF9	ØØ12Ø	STB	\$7FF9
7FE6	BF	7FFA	ØØ13Ø	STX	\$7FFA
7FE9	1ØBF	7FFD	99159	STY	\$7FFD
7FED	1F	A8	ØØ16Ø	TFR	CC,A
7FEF	B7	7FFF	99179	STA	\$7FFF
7FF2	39		99189	RTS	
		gggg	ØØ19Ø	END	
ggggg	TOT	AL ERRORS			_
100 100 2 5 15					(0)

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By Bernie Litton

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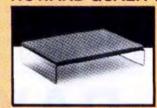
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by Steven Hirsch

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"This game is for naturally mellow folks who accept success as the reward for perseverance . . . "

NO NINES ALLOWED!

By Richard Ramella

To-niner is an innocent little listing. It's not much trouble to type in and run. But beyond that, it's a tricky test of your thinking ability. Some players have been known to never beat it. If you want to consider that as a dare, then do.

My best score is 39, so that's the score you should equal or *try* to beat. I think a score of 40 or more is impossible, but I hope someone proves me wrong. (If so, I'd like to hear about it.)

When you run the program you're presented with an eight-by-eight grid comprised of all letter O's, except for the 'X' in the northwest corner. To start, move the 'X' to the position where you want to begin. Tap the 'A' key for north, 'Z' key for south, comma key for west and period key for east. When ready to start the test, press 'P' for play. A numeral '1' appears in place of the 'X' and you've scored one point.

From this start, directional moves count upward to '8', then start over at '1'. Every move you make scores a point.

Of course, there's a catch. At any time during play, the game ends if any two numbers in a vertical row total nine or more. For example: At the start you press 'P' for play when the 'X' is in the northwest corner. Then, pressing the period key seven times counts from '2' to '8', ending at the northeast corner.

(Richard Ramella is a former newspaper editor who now works as a writer for a California hospital. He has published more than 200 Color Computer programs.)



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The only possible next move is south. You press the 'Z' key, a '1' is set beneath the '8' and the game ends because the two cells' numbers total nine.

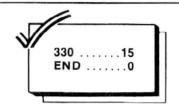
No-niner keeps score, won't let you move off the playing board or into previously set numbers, and ends the game when you have exceeded the legal vertical total of eight.

In keying in the game, remember the material within quotes in lines 160 and 390-430 is comprised of the letter 'O' and *not* a zero. Similarly, the material within quotes in Line 180 is the uppercase word for "OX" (as in strong as an ox).

This is a game for naturally mellow folks who accept success as the reward

for perseverance. Keep the desk pounders away from it; they might smite your CoCo to bits when they score a measly 16 points or so for the 20th time in a row!

(Any questions about *No-niner* may be directed to Mr. Ramella at 1493 Mt. View Avenue, Chico, CA 95926. Please include an SASE.)



The listing: NONINER

100 REM * NO-NINER * TRS-80 EXTE NDED COLOR BASIC 16K

11Ø REM * BY RICHARD RAMELLA

12Ø CLEAR 5ØØ

13Ø DIM A\$(1Ø)

14Ø CLS: PRINT "CAN YOU SCORE 39

15Ø FOR C=1 TO 1Ø

16Ø A\$(C)="ØØØØØØØØØØØ"

17Ø NEXT C

 $18\emptyset A$(2) = "\emptyset X" + RIGHT$(A$(2),8)$

19Ø X=2: Y=2: B\$="12345678"

2ØØ GOSUB 55Ø



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```
21Ø A$=INKEY$
22Ø IF A$="" THEN 21Ø
23Ø GOSUB 5ØØ: GOSUB 39Ø
240 IF AS="P" THEN MID$(A$(Y),X,
1) = "1": GOSUB 55Ø: GOTO 27Ø
25Ø GOSUB 55Ø
26Ø GOTO 21Ø
27Ø Q=1: S=1: C=2
28Ø A$=INKEY$
29Ø PRINT @ 36Ø, "SCORE"S;
300 IF A$="" THEN 280
31Ø GOSUB 5ØØ
32Ø IF INSTR("AZ,.",A$)=Ø OR A$=
"" THEN 28Ø
33Ø GOSUB 39Ø: GOSUB 55Ø
34\emptyset U=VAL(MID$(A$(Y-1),X,1))
35Ø M=VAL(MID$(A$(Y),X,1))
36\emptyset P=VAL(MID$(A$(Y+1),X,1))
37Ø IF U+M>8 OR P+M>8 THEN XX=1Ø
Ø: GOTO 5ØØ
38Ø GOTO 28Ø
39Ø IF Q=\emptyset THEN MID$(A$(Y),X,1)=
"ø"
4\emptyset\emptyset IF A$="A" AND Y>2 AND MID$(A
(Y-1), X, 1) = \emptyset THEN Y=Y-1: L=1
41Ø IF A$="Z" AND Y<9 AND MID$(A
(Y+1), X, 1) = \emptyset THEN Y=Y+1: L=1
42Ø IF A$="," AND X>2 AND MID$(A
(Y), X-1, 1) = \emptyset THEN X=X-1: L=1
43Ø IF A$="." AND X<9 AND MID$(A
(Y), X+1, 1) = \emptyset THEN X=X+1: L=1
440 IF Q=\emptyset THEN MID$(A$(Y),X,1)=
"X": RETURN
45Ø IF L=Ø THEN 28Ø ELSE L=Ø
46Ø MID$(A$(Y),X,1)=MID$(B$,C,1)
47Ø S=S+1: C=C+1
48Ø IF C=9 THEN C=1
490 RETURN
500 IF XX<>100 THEN RETURN
51Ø PRINT @ 416, "END SCORE: "S
52Ø FOR T=1 TO 1ØØØ
53Ø NEXT T
54Ø END
55Ø GH=76
56Ø FOR D=2 TO 9
57Ø PRINT @ GH, MID$(A$(D),2,8);:
 GH=GH+32
58Ø NEXT D
59Ø RETURN
6ØØ END
                                  9
```

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The Analog-To-Digital Converter, Part 1

By Tony DiStefano Rainbow Contributing Editor

he world inside your computer consists of zeros and ones — all that goes on inside your computer hinges on two values. Memory, PIAs, CPUs, VDGs and SAM chips all transfer information between each other using only two different states. These states are called *logic states*.

The first logic state is zero, also known as "low" or "lo." In the Color Computer (and most computers) a logic state low is zero volts, also known as ground level. The second logic state is one, also known as "high" or "hi." Again, in the Color Computer, a logic state high is five volts. Except for specified tolerances, all other voltages in between are undefined and if encountered can give the computer some unpredictable results. This is the digital universe of computers. Figure 1 shows a typical digital wave form.

The real world, however, deals in ever changing states. Digital ones and zeros are just two of millions of different states that exist. The real world is an analog world. A good example of the

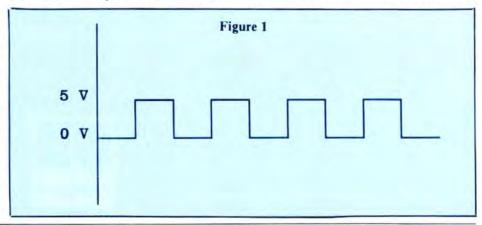
(Tony DiStefano is well-known as an early specialist in computer hardware projects. He lives in Laval Ouest, Quebec.)

analog world is speech. You can speak loud, you can speak low or many levels in between.

Sound waves are ever changing. For example, if you take a microphone and amplifier and hum into it, the speaker will vibrate, reproducing the sound you are making. That vibration is a back and forth motion. The frequency of the back and forth motion depends on the frequency of your hum. Frequency is measured by how many times a wave form goes back and forth in one second. Every time the speaker moves back and forth is one cycle.

From 1886 to 1888, the work of Heinrich Rudolph Hertz led to his discovery of electromagnetic waves. The German physicist's revelation opened the way for the development of radio, television and radar. As a tribute to him, the frequency of any wave, be it digital or analog, is measured in hertz (or Hz, for short). In the audible range, the frequency is from about 20 Hz to 20,000 Hz or 20 kHz. The 'k' stands for "kilo" meaning thousand. Our CoCos, for instance, run at 894,000 Hz or .9 MHz. The 'M' stands for "mega" meaning million.

Figure 2 shows a graphic representation of the output of a sound wave. Compare it to the wave form in Figure 1. There are some obvious differences;



it is these differences that make it impossible for a computer to directly and accurately read and duplicate an analog wave form.

Don't despair, there are ways around it. This is the first of a two-part project on how you can use a computer to measure analog signals. This project stems from several letters received from my readers requesting that I build a computerized oscilloscope adapter for the joystick port. I looked into the joystick port as an input, but found it to be inaccurate or not fast enough. By the time you finish reading this, you'll know why.

Anyway, this month we'll cover the theory on how a computer (and a little hardware) can convert an analog signal to a digital value. Next month we'll cover how to build and calibrate the analog to digital converter.

Now to the task of explaining how a computer can convert an analog signal to a digital value. The first thing the computer needs is some hardware, a comparator. A comparator is an IC that has two inputs (the "positive" input and the "negative" input) and one output.

The output has two states; on or off, good for a digital computer. The inputs, however, have analog inputs.

Here is how a comparator works. When the positive input voltage is higher (more voltage) than the negative input, the output is high. When the positive input voltage is lower (less voltage) than the negative input, the output is low. Figure 3 shows a block diagram of a computer-controlled comparator.

The way it works is simple. If we had a known voltage at the negative input, by reading the output (high or low) we could tell if the test voltage at the positive input is higher or lower than our reference voltage. Furthermore, if we change our reference voltage and zero into the unknown voltage, we will then know what the unknown voltage is. This technique is known as successive approximation.

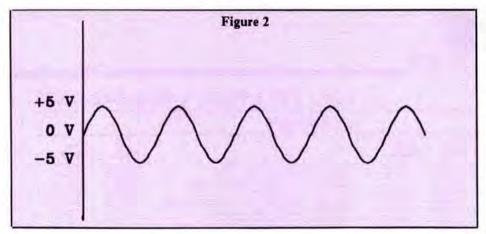
The procedure for successive approximation is as follows: Start by putting half of the maximum voltage your device can measure to the reference voltage. If the output of the comparator is high, that means the unknown voltage

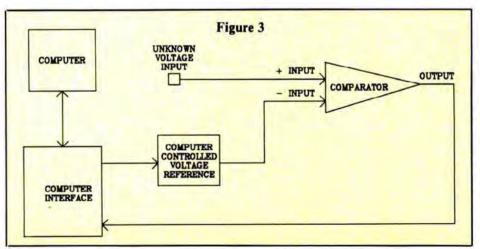
is higher than the reference voltage. We then increase the reference voltage by half the difference of the present value and the last value and test again. If the output of the comparator is low, that means the unknown voltage is lower than the reference voltage. We would then decrease the reference voltage by half the difference and test again. Continue to do this until we have reached the unknown voltage.

Let's take an example. In this example, I round off the reference voltage to the nearest whole number for ease of calculation. The maximum voltage is 100 and the unknown voltage 47. The first reference value is 50 - too high, so we subtract from the present value using the successive approximation method. New reference is now (100-50)/ 2 or 50-25; the new reference is 25 too low, so we add. The new reference is now (50-25)/2 or 25+13; the new reference is 38, still too low. Add again, (25-38)/2 or 38+7. The new reference is now 45, again too low. Add (38-45)/ 2 or 45+4 and the new reference is 49. That's too high, so substract (49-45)/ 2 or 49-3. The new reference is now 46, which is too low, so add (46-49)/ 2 or 46+2. The new reference voltage is now 48. Too high, so substract (49-48)/2 or 48-1. We have now reached the point where our reference voltage matches the unknown voltage.

Actually, the rounding off is not limited to integer calculation, but rather to the resolution of the reference voltage. When zeroing into the unknown voltage, you divide until the unit change in voltage is one. You cannot divide and get a more accurate fix on the unknown value. No matter how close you get, the comparator will always give a higher or lower value. The more accurate the reference, the closer you get to the real value of the unknown voltage.

This reference accuracy is one of the reasons why I chose not to use the joystick input. You see, inside the Color Computer there is all of the previously mentioned circuitry: a voltage comparator, a variable voltage reference, an unknown voltage input (joystick) and the interfacing circuit to control it all. A more common name for a variable voltage reference is "Digital-to-Analog Converter" or DAC for short. The DAC inside the CoCo is limited. It has a fixed output of .25 to 4.75 volts and the resolution of about 0.0715 volts.





The range is not very good for an analog-to-digital project.

Another reason for not using the joystick input is speed. You see, the successive approximation method talked about earlier is time-consuming. The CPU has to calculate the next reference voltage value, set up the DAC, read the comparator output and make the proper decision.

The speed at which an unknown voltage can be found is very important. When the unknown voltage is stable and not changing, the computer can take all the time in the world to figure out what the voltage is. But, if the unknown voltage is changing, like the humming mentioned earlier, speed is important.

The amount of time it takes the CPU or other device to find an unknown voltage value is called the "conversion time." The faster the conversion time, the more samples can be taken and the more accurate the wave shape reproduction can be. For example, if you have a loop to read the A to D converter which takes 10 ms (ms = milliseconds = 1/1000 seconds), that means you have

COMPLITEDO

100 samples per second. If you are sampling a wave form that is 1,000 Hz, you will miss a lot of information. It is safe to say you need at least 10 times the sample rate to reproduce a particular sine wave with reasonable accuracy.

A BASIC loop using the JDYSTK command will limit you to about 3 Hz—not very fast. In machine language, you can get a lot faster, but it is still slow due to the overhead created by the CPU having to do the conversion. In the case that the CPU has an external A to D converter, a great increase in speed and accuracy can be achieved. With the right software the effective conversion rate for an external A to D could be as high as 800 hertz.

The last thing I must mention this month is that the A to D circuit requires negative voltage. This is no problem with the first CoCos, but it is with the CoCo 2. The CoCo 2 has no negative voltage available at the cartridge connector. There is, however, negative voltage available inside the CoCo 2.

To bring this voltage to the cartridge connector is simple; you just need one

piece of wire and a soldering iron. First, unplug the computer, then open it and locate the chip with the number SC77527; this is the SALT chip. You will find -12 volts on pin 15 of this chip (just what the doctor ordered). Solder one end of a piece of wire to that pin. Locate pin #1 of the cartridge connector (it is the top pin closest to the back of the computer) and solder the other end of wire to this pin. Before you plug anything into the computer, measure the voltage to that pin. It should be about -12 volts, give or take two volts.

On the CoCo 2 this pin is normally not connected to anything. On the regular CoCo, this is the regulated -12 volt pin. The -12 volts you just added to that pin are not regulated, but in this and most cases, it will not matter. There will be a negative voltage regulator on the A to D convertor. Of all the peripherals I have seen for the CoCo, only one uses the negative voltage and it doesn't matter that it is not regulated.

If all is well, close your computer and I'll see you next month with Part 2 of the A to D converter.

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Learning The Art Of Written Expression With Proper Punctuation

By Steve Blyn Rainbow Contributing Editor

out for the Penguin!" exclaimed Robin.

There are quite a few punctuation marks in the preceding paragraph. Using punctuation marks correctly was almost becoming a lost art until recently. The "back to basics" movement occurring in many school systems has included stressing the teaching of written expression. The proper use of punctuation marks is an essential part of this skill.

Punctuation Quiz reviews the uses of punctuation marks. A chart is displayed listing major punctuation marks and shows their keyboard symbols. The student is then quizzed on when to use each of the marks illustrated on the chart. The student's task is to type in the answer to the computer's questions.

Rather than having the student insert the actual mark as the answer, we felt it proper, in this case, to require the correct spelling of names of the punctuation marks. This is always a difficult decision to make when writing any educational program. It presents a double-edged sword: On one hand, we always prefer to teach correct spelling; on the other hand, a child often feels cheated if he knows the correct answer but misspells it and gets marked as wrong.

We compromised on the issue this time. Exact spelling is the only way to get a correct answer in this program. The pressure is eased, however, by omitting any scoring in the program. While we do want the children to learn to spell words correctly, we do not want, at the same time, to penalize them too severely for minor spelling mistakes. After each group of five questions, the student may press 'C' to continue or 'E' to end the program. The program may be played continuously until the student learns all of the marks in the program.

Punctuation Quiz also helps to familiarize children with the keyboard/typewriter symbols. Punctuation marks are often confusing to beginners because the SHIFT key must be used to produce some of them. Fortunately, the CoCo's keyboard is very similar to that

of a standard typewriter. More than half of the punctuation marks are in similar positions. Many other computers have keyboards that are quite different from a standard typewriter keyboard.

Beginners should be encouraged to gain familiarity with using all of the CoCo's keyboard symbols. The only odd punctuation marks we have are the brackets. The left bracket is made by simultaneously pressing the SHIFT and down-arrow keys and the right bracket is made by pressing the SHIFT and right-arrow keys. (I have trouble remembering this myself and always have to check it out first.)

Line 50 reads the DATA statements necessary for the chart. Line 60 reads the DATA statements for the questions and answers. Lines 70-100 print out the chart of quotation marks and their symbols.

Lines 190-320 contain the quiz. Line 210 randomly selects one of the 11 possible question and answer sets. Line 220 prints the chosen question. Lines 260-270 check to see whether the answer is correct. If it is incorrect, the correct answer will be displayed.

After five questions, the student may begin again or end the program by pressing either the letter 'C' or 'E'. The

(Steve Blyn teaches both exceptional and gifted children, holds two master's degrees and has won awards for the design of programs to aid the handicapped. He and his wife, Cheryl, own Computer Island.)

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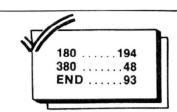
routine on lines 320-340 takes care of this task. A record of the student's score could be added between lines 320-330 if you desire one. This can easily be achieved by incrementing a counter on Line 260. To achieve this, add CR=CR+1 at the end of Line 260.

Each time a question is answered

correctly, the counter will increase by one. You could then create a line such as 325 PRINT CR:CR=0. This would indicate the score and reset the count to zero for the next round.

As discussed earlier, we did not feel the need for a scorecard in this particular program. The choice, of course, is yours. As always, please feel free to alter this program as you see fit to help your children and students benefit the most from it.

(You may contact Mr. Blyn with any questions about Punctuation Quiz at 227 Hampton Green, Staten Island, NY 10312. Please include an SASE.)



The listing: PUNCQUIZ

1Ø REM"PUNCTUATION QUIZ" 2Ø REM"STEVE BLYN, COMPUTER ISLAN D,NY,1985 3Ø DIM A\$(11),B\$(11),C\$(11),D\$(1 1) 4Ø CLS 5Ø FOR I=1 TO 11:READ A\$(I),B\$(I):NEXT I $6\emptyset$ FOR I=1 TO 11: READ C\$(I),D\$(I):NEXT I 70 PRINT" PUNCTUATION MARK S" NAME" 8Ø PRINT" MARK 9Ø PRINT" _____! ____ 100 FOR A=1 TO 11:PRINT A TAB(2) A\$(A) TAB(13)B\$(A): NEXT A 11Ø REM"CHOOSE A DECORATIVE PATT ERN" 12Ø NN=128+RND(127) 13Ø PR\$=STRING\$(32,NN)

15Ø PRINT@484,"PRESS <ENTER> TO GO ON"; 16Ø EN\$=INKEY\$

14Ø PRINTPR\$;

17Ø IF EN\$=CHR\$(13) THEN 18Ø ELS E 16Ø

18Ø FOR T= 1 TO 5

19Ø CLS

200 PRINT" PUNCTUATION QU

IZ":PRINT PR\$; 21Ø R=RND(11)

22Ø PRINT@96,C\$(R)

23Ø PRINT@192," ":PRINT@192,"ANS

WER";

24Ø INPUT E\$

25Ø PRINT@288, PR\$;

 $26\emptyset$ IF E\$=D\$(R) THEN SOUND $2\emptyset\emptyset$, 2

:PRINT@ 364, "CORRECT"

 $27\emptyset$ IF E\$<>D\$(R) THEN SOUND $2\emptyset$, 3 :PRINT@362,D\$(R):PRINT"IS THE CO

RRECT ANSWER THIS TIME." 28Ø PRINT@ 484,"PRESS <ENTER> TO

GO ON";

```
29Ø EN$=INKEY$
3ØØ IF EN$=CHR$(13) THEN CLS ELS
E 29Ø
31Ø NEXT T
32Ø CLS RND(8):PRINT@96,"
                              PRE
SS <C> TO CONTINUE
                            OR <E
> TO END THE PROGRAM."
33Ø EN$=INKEY$
340 IF ENS="C" THEN RUN ELSE IF
ENS="E" THEN END ELSE 33Ø
35Ø DATA ",",COMMA
36Ø DATA ., PERIOD, ?, QUESTION MAR
K,!, EXCLAMATION POINT,;, SEMICOLO
N,":", COLON, -, HYPHEN
37Ø DATA ( ), PARENTHESES,[
RACKETS, '' '', QUOTATION MARKS, ',
APOSTROPHE
38Ø DATA THIS COMES AT THE END O
FA
         DECLARATIVE SENTENCE., P
ERIOD
39Ø DATA THIS IS USED TO SHOW ST
         FEELINGS OR EMOTIONS., E
XCLAMATION POINT
          THIS IS USED IN PLACES
4ØØ DATA
 WHERE YOUWOULD PAUSE IN SPEAKIN
G., COMMA
41Ø DATA THIS IS USED BETWEEN TW
O MAIN
         CLAUSES NOT JOINED BY A
         CONJUNCTION., SEMICOLON
42Ø DATA THIS IS USED BEFORE A L
IST OF
         ITEMS., COLON
43Ø DATA THIS IS USED TO SHOW PO
SSESSION OR OWNERSHIP., APOSTROPH
44Ø DATA THIS IS USED TO DIVIDE
A WORD
         INTO PARTS AT THE END O
F A LINE., HYPHEN
45Ø DATA THESE ARE USED TO ENCLO
SE AN
         EXTRA WORD OR WORDS., PA
RENTHESES
46Ø DATA THESE ARE USED TO ENCLO
SE ITEMS FOUND WITHIN PARENTHESE
S., BRACKETS
47Ø DATA THESE ARE USED TO SHOW
SOMEONE'SEXACT WORDS., QUOTATION
MARKS
480 DATA THIS IS USED AT THE END
 OF AN
         INTERROGATORY SENTENCE.
```

(A)

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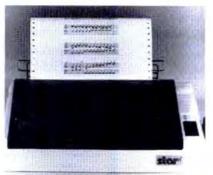
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· Output music to your printer (Gemini 10X, Epson, R.S. printers).



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Volume Levels	16	i	1	1
Articulation Rates	8	1	1	1
Vocal Tract Filter Settings	255	1	1	1
Basic unit of Speech	64 phonemes 4 durations each	64 phonemes	64 allophones 5 pause lengths	64 phonemes
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Computers Can Play An Important Role In Art Education

By Michael Plog, Ph.D. Rainbow Contributing Editor

hen dealing with computers and education, the subject matter area getting the short end of the electronic stick is the arts. This is understandable in some ways, but really doesn't make much sense — for the arts or for education.

In general, elementary schools use computers most frequently with math, followed by language arts, reading, computer programming, social studies, science and then art. (This is a finding from the National Commission for Employment Policy, "Uses of Computers in Education," conducted by Education Turnkey Systems, Inc.) We can easily understand why computers are most frequently used with mathematics. After all, computers are mathematical calculating machines, and math teachers have been trained in such things as calculating machines. Art teachers are creative people who deal with such things as paint, clay or other products.

Of course, the concept of "art" covers a wide range of activities. There are the

performing arts, such as dance, theater, mime, magic, music and so on. Commercial art covers such things as photography and drafting. Some schools even include film making in the curriculum.

The amazing thing is that in most fields of art the computer has been used by professional artists, but not in the schools, where students are usually introduced to the arts. Much of the past "computer art" depended on the ability of the computer to produce random numbers. Then, a song or painting or some other artistic product was created using the random numbers.

The random effect has been used in the past with some degree of success. Mozart (in 1777) composed a piece of music by using dice to help pick a scale. One hundred and eighty years later (1957), Lejaren Hiller and Leonard Isaacson composed the "Iliac Suite for String Quartet" using random numbers generated by a computer. Generally, however, the random number approach to art results in a product that is appreciated only by the artist (if that much).

There is much more to computerassisted art (and art education) than random numbers. We listen to a lot of computer music. Moog synthesizer and electronic guitars are commonplace today. The computer provides not only the music, but in some cases, provides the structure of a piece and relieves the artist of many mundane tasks, from writing musical notes to reading them. Vangelis, who provided the score for the movie *Chariots of Fire*, cannot read music. But, he can generate art.

Computers are used to help in all kinds of animation, from Saturday morning cartoons to commercials. In fact, were it not for computers, we would have much less animation today than in the past. Salaries have increased a lot since Walt Disney directed a team of animators.

Computer-generated graphics are not only used to present subatomic particles and the structure of DNA (which looks like art to me), but pieces that hang in museums. Computers have been used to analyze the movements of dancers and runners for training purposes. John Swartzwelder has even used a CoCo to create one-line jokes (example: Scientists discover new moon orbiting Kate Smith). Computers have been used to mathematically analyze prose and poetry of great masters and then mimic that style to produce (some not so great) literary efforts.

So, if artists use computers, why should art students not be using them? There are several reasons. First, we do not expect students, especially elementary students, to produce great works

(Michael Plog received his Ph.D. degree from the University of Illinois. He has taught social studies in high school, worked in a central office of a school district, and currently is employed at the Illinois State Board of Education.) of art. We expect them to learn about art instead of attempting to compete with professionals. Second, most of the computer applications mentioned here involve rather sophisticated software, which artists are unwilling to share with a group of elementary students. Also, there are few software publishers who provide computer-assisted instruction packages (still the most frequent use of computers in schools) for art. Finally, art teachers may not realize what students can do with the help of a computer.

I hold the position that students even in primary grades— can use the computer to help them learn about the arts. I believe students should learn art by actually doing it. They should learn about painting by organizing colors and shapes; about music by organizing sound in meaningful patterns; about dance by studying movement.

Consider the easiest one first: music. My nephew recently showed me a music program for the Color Computer. The screen shows the music staffs, and by movement of the cursor and command keys, notes are placed on the staff. It seems to make sense that students would learn about music by writing it and listening to their compositions being played. The teacher could introduce such concepts as chords and harmony by showing students how to improve their own music. The students have a stake in their creations. Music by other people becomes more "real" to one who has written music.

It is difficult to convince a band to play a piece of music written by an elementary student. Especially when there may be 30 such students, each wanting to hear their own creation 100 times. It is not so difficult, on the other hand, to convince the Color Computer to play a musical composition written by a student. It is easy for the student

to make changes in the music stored in a Color Computer and hear the results. It is hard for a student to change a few notes in a piece of music and expect a "live" band to immediately play again the altered piece. Thus, this piece of software seems to be an ideal teaching tool.

The initial barriers keeping the teacher away from the student are more easily overcome. The student learns about music by actively engaging in the process of organizing sound. It seems reasonable that such an approach would increase the motivation to learn how to play an instrument.

How about other arts? The computer can be used to help the student learn about painting as well as music. The Color Computer has some wonderful graphics packages. Students can first create, then print their masterpiece on paper to be displayed on the refrigerator door.

Beginning students make simple mistakes that can ruin an art project. With a graphics package, it is easy to correct these little problems before the final product is ready. This makes the final product easier to accept, as well as giving the student a valuable lesson that art is a dynamic, changing expression rather than a "first time only" event.

In kindergarten classes, a pre-art activity is to learn colors and shapes. The Color Computer is an ideal machine for computer-assisted instruction with kindergarten students. It is easy to imagine a student running a program which draws a triangle on the screen while the cassette recorder is talking about triangles. The triangle is colored red while the cassette provides a verbal explanation of the color red. As with all computer-assisted instruction packages, a major advantage is that the student can participate in the lesson

as many times as needed.

Now, I do not know if such a program is already on the market. I doubt that it would require a master programmer to put together a unit on colors and shapes. If you have written one, please let me know about it and I will share that information through these pages.

So far, we have presented examples of computer-assisted art lessons for primary students. The same graphics packages mentioned could be used as a supplemental activity in a drafting class in a high school. The student could design the initial drafting project using a commercial graphics package, then complete the paper version based on changes and corrections made to the electronic rough sketch. Dance students in high school could use the screen as a model of a stage for choreographing movement, then translate the mental image to physical movement.

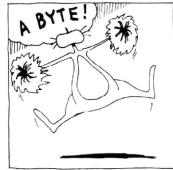
There is probably no end to the opportunities offered students with this blend of the computer and the arts. Before leaving this idea, a pratical point should be raised. The arts are a very important part of education and one of the key subject matter areas for students to learn about our cultural heritage. Yet, when budget crunches happen in schools, the arts often suffer the most. The use of computers can help continue this crucial part of education while still allowing for budget reductions.

I must mention one of the most creative arts, computer programming. Just think, by your knowledge and skill, you can use a medium of expression (your Color Computer) to generate a work of beauty. Your programs can be poetry, even if you are the only reader. I welcome your thoughts on this subject, and would appreciate reading anything you want to send to me at 829 Evergreen, Chatham, IL 62629.

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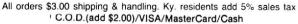
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You may not fill your local theater, but you can create animation that will impress your friends and family

long with many others, I have always wanted to experiment with animation. Being an avid "Bugs Bunny" fan, I've often said to myself, "Hey! I'd like to make cartoons, too." Now with the help of my Color Computer and this program, I can create animation for games, graphics demonstrations or just for fun.

The first problem confronted in designing this program was space. I wanted the pictures for

(Wayne Thume works as a programmer) operator at Airpax Corporation, a division of North American Phillips. He did his first programming on the Color Computer. Wayne lives in Trappe, on the Eastern Shore of Maryland.)

By Wayne Thume

the animation to be held in the computer's memory and not on tape or disk. Since storing too many pictures would take up an incredible amount of space, I decided to reduce each picture to a 16-by-32 grid.

Now before you quit reading this article in disgust, let me assure you there is more than enough room for significant high resolution animation. Using this grid 96 pictures can be created, which will allow for about 20 seconds of animation. I'll be the first to admit that 20 seconds doesn't sound like very long, but after drawing 96 pictures you will be convinced that it is far too long.

The next problem was which language to write the program in. I chose BASIC so anyone could easily interpret and modify the program to suit his or her own tastes. Using GET and PUT, I was able to store and retrieve pictures at the high rate of speed that is needed to show the animation. The pictures are stored on pages five through eight of the graphics memory. They are displayed on the Hi-Res screen PMODE 4,1 which uses the first four pages of graphics memory.

Using this small amount of memory allows for enough room to create a program to utilize the graphics for some different programming applications.

After the program is typed in and run, there will be a menu which allows you to either 1) create a picture, 2) see the animation, 3) save animation, 4) load animation or 5) quit the program. Choosing the first option will take you to the Hi-Res screen PMODE 4,1 where there is a flashing rectangle. The size of the rectangle represents the size of the area you may animate. The rectangle may be moved to any area of the screen with a joystick. Once you have chosen the area to animate, press the joystick firebutton and the area within the flashing rectangle will be enlarged and placed on the Lo-Res screen. You have several commands to create the picture at this point (these are all summarized in a chart at the end of this article). Once your picture is finished, it will be stored and you will again return to the menu.

The second option in the menu will display the animation that has been created. If you choose this option, the computer will switch to the Hi-Res mode and the first picture in the animation sequence will be shown. To start the animation, press the space bar. You may stop the animation at any point by pressing any key other than the space bar. To resume animation, press the space bar again. To quit the display sequence before it has ended, press 'Q' and the program will return to the menu.

Option three will save the picture sequence on cassette tape or disk drive. If you choose this option, you will see what appears to be garbage forming at the top of the screen. This "garbage" is actually the screen locations for all 96 pictures that have been poked into the video memory. The program stores all of the information in two files, one for the screen locations of the pictures and one for the pictures themselves. Once you have given a filename and specified tape or disk, the computer will save the data and return to the menu.

With the fourth option you will be asked for the name of a file that has been previously saved. Once this is entered, merely specify whether you are using tape or disk drive and the computer will load the pictures and return to the menu.

The last option allows you to exit the program. The screen will clear and return to the BASIC mode.

There are many areas of the program that are not explained adequately, so I have included a sample animation program. Since an actual cartoon would be too long to create, I had to stick to a simple graphics demonstration. The animation is that of a circle traveling in sine wave moving downward. The circle is simultaneously passing back and forth across a

vertical line in the center of the screen. It may not be the best example, but it does show how much greater speed can be achieved in your BASIC programs.

When the program is run, it will first display a line and the circle, then the program will GET the 16-by-32 area which includes the circle and part of the line. Next the computer clears the screen and redraws the picture with the circle moved to the new position. Slowly, each new position is drawn and recorded until the circle reaches the bottom. The reason it takes so long to draw this sequence is because the computer must draw and erase each picture before it can draw the next one.

After this sequence has been recorded the animation will be displayed. First, some colorful patterns are drawn on either side of the screen to demonstrate that the animation can be displayed on a screen without having to erase



any picture which may already be there. Next, you will see the circle move down the screen — note the smooth and quick movement as the circle glides down the screen.

And now to explain the gimmick. Refer to the graphics picture above. There is no program included to draw this picture. The fact is, I drew this picture dot by dot with a graphics editor and it would be impossible to create a short program to reproduce it. When I create my animation, I display it on the little movie screen in the picture; this makes my feeble cartoons look much more impressive.

If you would like a copy of this screen, I would be glad to send one if you send me a tape or disk and enough money to pay for postage to send it back. I would also like to see any animation you create using my program. My address is Route 2, Box 119, Trappe, MD 21673.

Summary of Commands for Option 1: Create Picture

Kev

Function

Arrow keys - will move dot around screen to desired position

S sets point on the screen

R - resets point on screen

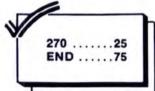
O - Shows Hi-Res screen PMDDE 4,1. Press any key and it will switch to PMODE 4,5 where the pictures are stored. Press any key again and the computer will return to the Lo-Res screen.

gets any of the 96 pictures you choose and puts it on the screen

- clears screen

switch mode. The first time this is pushed you will be given the option to choose the (S)et or (R)eset mode. Now when you move the cursor dot with the arrow keys, it will either erase points or set points wherever it moves. To exit this mode press the 'X' key again.

Q — quit and return to the menu



Listing 1: ANIMATE

- 1Ø PCLEAR 8
- 2Ø PMODE 4,1
- 3Ø SCREEN 1,1
- 4Ø Z=1:B=8
- 5Ø DIM S(32,16)
- 6Ø FOR X=Ø TO 255 STEP 32
- 7Ø FOR Y=Ø TO 191 STEP 16
- 8Ø GOSUB 14Ø
- 9Ø GET(112,B-7)-(143,B+8),S,G
- 100 PMODE 4,5
- 11Ø PUT(X,Y)-(X+31,Y+15),S,PSET
- 12Ø NEXT Y,X
- 13Ø GOTO 27Ø
- 14Ø PMODE 4,1:PCLS
- 15Ø B=B+1
- 16Ø A=SIN(Z)*1Ø
- 17Ø A=A+128

```
18Ø IF C=1 THEN C=Ø:GOTO 25Ø
19Ø CIRCLE(A,B),5
200 C=1
21Ø LINE(127,Ø)-(127,192),PSET
22Ø LINE(128,Ø)-(128,192), PRESET
23Ø LINE(129,Ø)-(129,192),PSET
24Ø Z=Z+.1:GOTO 26Ø
25Ø Z=Z+.1:GOTO 14Ø
26Ø RETURN
27Ø REM SEE ANIMATION
28Ø PMODE 4,1:PCLS
29Ø PMODE 3,1
300 FOR UO=1 TO 4:PCLS UO:NEXT:P
CLS2
31Ø PMODE 4,1:SCREEN 1,1
32Ø LINE(112,Ø)-(143,192), PRESET
, BF
33Ø LINE(9,9)-(1Ø2,182), PSET, BF
34Ø LINE(153,9)-(246,182), PSET, B
35Ø LINE(127,Ø)-(127,192),PSET
36Ø LINE(129,Ø)-(129,192),PSET
37Ø CIRCLE(56,96),4Ø,Ø
38Ø CIRCLE(199,96),4Ø,Ø
39Ø W=7
400 FOR X=0 TO 255 STEP 32
41Ø FOR Y=Ø TO 191 STEP 16
420 PMODE 4.5
43\emptyset \text{ GET}(X,Y) - (X+31,Y+15),S,G
```

45Ø PUT(112,W)-(143,W+15),S,PSET

48Ø CLS:PRINT@228, "AGAIN (Y/N)";

49Ø A\$=INKEY\$:IF A\$="" THEN 49Ø

500 IF A\$="Y" THEN SCREEN 1,1:W=



47073 660153 960194 1240 166 1520 173 1790141 END51

210237

;

Listing 2: DEMO

10 PCLEAR 8

44Ø PMODE 4,1

46Ø W=W+2 47Ø NEXT Y,X

1:GOTO 39Ø 51Ø END

2Ø	DIM S(32,16)
3Ø	DIM T(97,2)
4Ø	PMODE 4,1
5Ø	AB\$="NONE"
6Ø	CLS
7Ø	SCREEN Ø,Ø
8Ø	PRINT@4Ø, "graphic";
9Ø	POKE 1071,32
1Øg	PRINT@48, "animator"

```
55Ø CD=15:CE=7:D=Ø
11Ø PRINT@73,"BY WAYNE THUME"
                                      56Ø C=POINT(CD,CE)
12Ø PRINT@133,STRING$(21,"x")
                                      57Ø PRINT@Ø,STRING$(32,143);
13Ø PRINT@16Ø,"
                    x<1> CREATE
                                      58Ø A$=INKEY$
PICTURE x"
                                      59Ø IF C=1 THEN RESET(CD,CE):SET
14Ø PRINT
                                      (CD, CE, 1):ELSE SET(CD, CE, 1):RESE
                                      T(CD,CE)
15Ø PRINT"
               x<2> SEE ANIMATIO
                                      6ØØ IF A$="" THEN 58Ø
  х"
                                      61Ø J2=J1+(CD-15):K2=K1+(CE-7)
16Ø PRINT
                      X
                                      620 IF P=1 THEN SET(CD,CE,1):PSE
                                      T(J2,K2)
17Ø PRINT"
               x<3> SAVE ANIMATI
                                      63Ø IF P=2 THEN RESET(CD,CE):PRE
ON x"
                                      SET(J2,K2)
18Ø PRINT"
                                      64Ø IF A$="S" THEN SET(CD,CE,1):
  x"
                                      PSET(J2,K2)
19Ø PRINT"
               x<4> LOAD ANIMATI
                                      65Ø IF A$="R" THEN RESET(CD,CE):
ON X"
                                      PRESET (J2, K2)
2ØØ PRINT"
               X
                                      66Ø IF A$="X" THEN GOSUB 81Ø
   х"
                                      67Ø IF A$="C" THEN GOSUB 9ØØ
21Ø PRINT"
              x<5> QUIT
                                      68Ø IF A$="G" THEN GOTO 1ØØØ
  x"
                                      69Ø IF A$="O" THEN GOSUB 11ØØ
22Ø PRINT@453,STRING$(21,"x")
                                      700 IF A$="Q" THEN GOTO 1200
23Ø A$=INKEY$
                                      71Ø IF A$=CHR$(94) THEN CE=CE-1
24Ø IF A$="" THEN 23Ø
                                      72\emptyset IF A$=CHR$(1\emptyset) THEN CE=CE+1
25Ø ON VAL(A$) GOTO 27Ø,127Ø,143
                                      73Ø IF A$=CHR$(8) THEN CD=CD-1
Ø,181Ø,212Ø
                                      74Ø IF A$=CHR$(9) THEN CD=CD+1
26Ø GOTO 23Ø
                                      75Ø IF CD<15 THEN CD=46
27Ø REM CHOOSE PICTURE
                                      76Ø IF CD>46 THEN CD=15
28Ø CLS
                                      77Ø IF CE<7 THEN CE=22
29Ø PRINT"LAST PICTURE: ";AB$
                                      78Ø IF CE>22 THEN CE=7
3ØØ PRINT@224,"WHICH PICTURE ";
                                      79Ø GOTO 56Ø
31Ø INPUT AB$
                                      8ØØ GOTO 6Ø
32Ø IF VAL(AB$)<1 OR VAL(AB$)>96
                                      81Ø REM SWITCH MODES
THEN 3ØØ
                                      82Ø IF FL=1 THEN FL=Ø:P=Ø:RETURN
33Ø REM CREATE PICTURE
                                      83Ø FL=1
34Ø SCREEN 1,1
                                      84Ø PRINT@Ø, "SWITCH TO <S> OR <R
35Ø J=JOYSTK(Ø):K=JOYSTK(1)
                                      >ESET
36Ø J1=J*3.57:K1=K*2.82
                                      85Ø B$=INKEY$
37\emptyset \text{ GET}(J1,K1) - (J1+31,K1+15),S,G
                                      86Ø IF B$="" THEN 85Ø
38Ø PUT(J1,K1)-(J1+31,K1+15),S,P
                                      87Ø IF B$="S" THEN P=1:RETURN
RESET
                                      88Ø IF B$="R" THEN P=2:RETURN
39Ø C=PEEK(6528Ø):T=J1:U=K1
400 IF C=126 THEN R=X:GOTO 440
                                      89Ø GOTO 85Ø
                                      900 REM CLEAR SCREEN
41Ø IF C=254 THEN R=X:GOTO 44Ø
                                      91Ø PRINT@Ø, "CLEAR SCREEN (Y/N)"
42Ø PUT(J1,K1)-(J1+31,K1+15),S,P
                                      92Ø B$=INKEY$
SET
                                      93Ø IF B$=""THEN 92Ø
43Ø GOTO 33Ø
                                      94Ø IF B$="Y" THEN COLOR Ø,1:LIN
44Ø REM ENLARGE PICTURE
                                      E(T,U)-(T+31,U+15), PSET, BF: COLOR
45\emptyset V=VAL(AB$):T(V,1)=T:T(V,2)=U
46Ø SCREEN Ø,Ø
                                       1,Ø:GOTO 97Ø
                                      95Ø IF B$="N" THEN 54Ø
47Ø PUT(J1,K1)-(J1+31,K1+15),S,P
                                      96Ø GOTO 92Ø
SET
                                      97Ø FOR XI=1Ø3 TO 359 STEP 32
48Ø CLS
                                      98Ø PRINT@XI,STRING$(17,128);
49Ø FOR X=15 TO 46
                                      99Ø NEXT XI:RETURN
5ØØ FOR Y=7 TO 22
                                      1000 REM GET PICTURE
51\emptyset C=PPOINT(J1+(X-15),K1+(Y-7))
                                      1010 PRINT@0, "GET WHICH PICTURE
520 IF C=1 THEN SET(X,Y,1) ELSE
RESET(X,Y)
                                      1020 INPUT ACS: V=VAL(ACS)
53Ø NEXT Y,X
                                      1030 IF V<1 OR V>96 THEN 1010
54Ø REM START
```



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1Ø4Ø GOSUB 158Ø 1050 PMODE 4,5 1060 GET(X,Y)-(X+31,Y+15),S,G 1070 PMODE 4,1 1080 PUT(T,U)-(T+31,U+15),S,PSET 1Ø9Ø GOTO 44Ø 1100 REM SEE HI-RES SCREEN 1110 PMODE 4,1 112Ø SCREEN 1,1 113Ø IF INKEY\$="" THEN 113Ø 114Ø PMODE 4,5 115Ø SCREEN 1,1 116Ø IF INKEY\$="" THEN 116Ø 117Ø PMODE 4,1 118Ø SCREEN Ø,Ø 119Ø RETURN 1200 REM SAVE AND QUIT 121Ø GOSUB 158Ø 1220 GET(T,U) - (T+31,U+15), S,G123Ø PMODE 4,5 124Ø PUT(X,Y)-(X+31,Y+15),S,PSET 125Ø PMODE 4,1 126Ø GOTO 6Ø 127Ø REM SHOW ANIMATION 128Ø SCREEN 1,1 129Ø RJ=1 13ØØ FOR X=Ø TO 255 STEP 32 131Ø FOR Y=Ø TO 191 STEP 16 132Ø PMODE 4,5 133 \emptyset GET(X,Y)-(X+31,Y+15),S,G 134Ø PMODE 4,1 135Ø PUT(T(RJ,1),T(RJ,2))-(T(RJ, 1)+31,T(RJ,2)+15),S,PSET 136Ø RJ=RJ+1 137Ø IF PEEK(339)=251 THEN 6Ø 138Ø IF PEEK(345)=247 THEN 139Ø ELSE 137Ø 139Ø NEXT Y,X 1400 GOTO 60 141Ø END 142Ø GOTO 6Ø 143Ø REM END PROGRAM 144Ø CLS 145Ø Y=1 146Ø FOR X=1Ø24 TO 1215 STEP 2 147Ø POKE X,T(Y,1) 148Ø POKE X+1,T(Y,2) 149Ø Y=Y+1 15ØØ NEXT X 151Ø PRINT@48Ø," SAVE ON (T) AP E OR (D) ISK"; 152Ø A\$=INKEY\$:IF A\$="" THEN 152 153Ø PRINT@48Ø," 154Ø IF A\$="D" THEN 165Ø 155Ø IF A\$="T" THEN 172Ø 156Ø SOUND 1,1:GOTO 151Ø

GOTO 6Ø)APE OR (D)ISK?" 157Ø 1580 REM FIND AREA FOR PICTURE 186Ø A\$=INKEY\$:IF A\$="" THEN 186 159Ø VA=Ø 1600 FOR X=0 TO 255 STEP 32 187Ø IF A\$="D" THEN 19ØØ 161Ø FOR Y=Ø TO 191 STEP 16 188Ø IF A\$="T" THEN 2ØØØ 162Ø VA=VA+1 189Ø SOUND 1,1:GOTO 185Ø 163Ø IF VA=V THEN RETURN 1900 LOADM NS 164Ø NEXT Y,X 191Ø N\$=N\$+"2" 1650 REM SAVE INFO ON DISK 192Ø LOADM N\$ 166Ø PRINT@416,"NAME";:INPUT N\$ 193Ø Y=1 167Ø N\$=LEFT\$(N\$,7) 194Ø FOR X=1Ø24 TO 1215 STEP 2 168Ø SAVEM N\$,9728,15871,Ø $195\emptyset T(Y,1) = PEEK(X)$ 169Ø N\$=N\$+"2" 196Ø T(Y,2)=PEEK(X+1) 17ØØ SAVEM N\$,1Ø24,1215,Ø 197Ø Y=Y+1 171Ø GOTO 6Ø 198Ø NEXT X 172Ø REM LOAD FROM TAPE 199Ø GOTO 6Ø 173Ø PRINT@416, "NAME";: INPUT N\$ 2000 CLS:PRINT@224, "POSITION TAP 174Ø N\$=LEFT\$(N\$,7) E AND PRESS ANY KEY." 175Ø PRINT@416, "POSITION TAPE AN 2010 IF INKEY\$="" THEN 2010 D PRESS ANY KEY."; 2Ø2Ø CLOADM N\$ 176Ø IF INKEY\$="" THEN 176Ø 2Ø3Ø N\$=N\$+"2" 177Ø CSAVEM N\$,768Ø,13823,Ø 2040 CLOADM NS 178Ø N\$=N\$+"2" 2Ø5Ø Y=1 179Ø CSAVEM N\$,1Ø24,1215,Ø 2Ø6Ø FOR X=1Ø24 TO 1215 STEP 2 18ØØ GOTO 6Ø $2\emptyset7\emptyset$ T(Y,1)=PEEK(X) 181Ø REM LOAD PICTURE $2\emptyset 8\emptyset T(Y,2) = PEEK(X+1)$ 182Ø CLS 2Ø9Ø Y=Y+1 183Ø INPUT"NAME ";N\$ 21ØØ NEXT X 184Ø N\$=LEFT\$(N\$,7) 211Ø GOTO 6Ø 185Ø CLS:PRINT@224,"LOAD FROM (T -212Ø CLS:END

SUPPORT:

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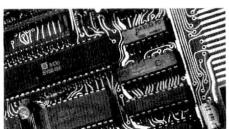
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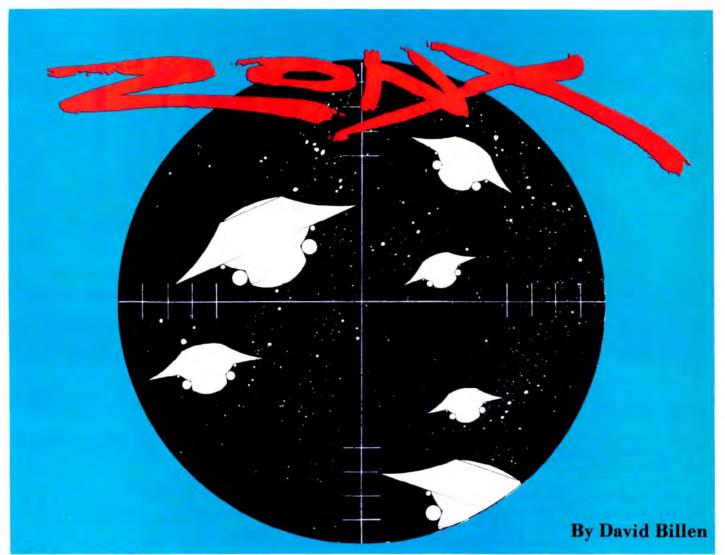
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ant great sound without sacrificing fast graphics? Zonx provides you with both! It proves that, without a doubt, the CoCo can produce sound without slowing the action, and as an added bonus, Zonx is fun!

To play Zonx, enter and run the program listing. If you have Extended BASIC, begin by typing PCLEAR 1. After you type RUN, the program begins reading the DATA statements and poking the numbers into memory. These numbers make up a machine language program. After all the numbers are poked, the BASIC programs will save

(David Billen is a self-employeed programmer. His hobby is music synthesis, ranging from his CoCo to Syncho drums.)

the machine language program to tape. You can load this program by typing CLOADM and run it by typing EXEC. Before testing Zonx, be sure to save the BASIC program that created it just in case you make a typing error and it does not work.

Once the program is up and running the first thing you see is a title screen. At this point, Zonx also plays a little heavy metal rock-and-roll music while waiting for you to press the right joystick button.

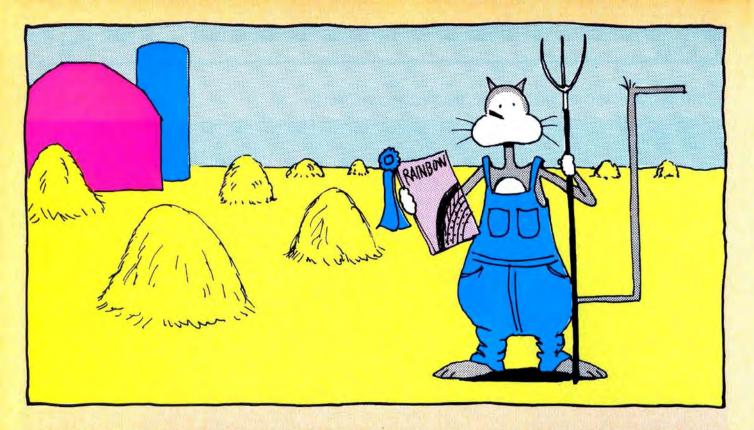
The game begins and your joystick controls a ship that moves right or left near the bottom of the screen. The ship will not stay still — something to do with gravitational photon intervention.

Two different types of characters will fly down the screen, "Zonxes" and "Zugs." Zonxes are the ones that flash; Zugs are the sluggy-looking things. A Zonx will not harm you, but if you can touch it with the very tip of your ship, the game will have a brief "spasm" and 100 points are rewarded. Conflict with a Zug is always fatal and, since the goal is to earn points, I suggest avoiding them.

You will encounter a wave of Zonxes, a wave of Zugs and a wave of both. If you survive this far, bonus points are awarded and the level of difficulty increases. After the fourth increase in difficulty the game never gets any harder. If you make it that far, you are doing incredibly!

I welcome correspondence from those who have questions or comments. My address is P.O. Box 832, Edmond, OK 73083. Please include an SASE.

Good luck, it's all in the wrist!



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Editor's Note: As we were going to press, David Billen advised us that four POKEs will be needed to correct a problem that has arisen on some CoCos. You can type in the following line and CSAVE it on tape before the Zonx ML program; to play the game, simply load this program (leave the Play button down on your recorder) and run it. After the four POKEs have been made, the ML program will be loaded and executed automatically.

1Ø CLS:PRINT@264,"LOADING zonx..
.":POKE359,127:POKE36Ø,255:POKE3
61,34:POKE362,57:CLOADM"ZONX":EX
EC

If you want to use the Zonx program on disk, change CLDADM in this loader program to LDADM. Since the following listing will not run on a disk system, run it with the controller unplugged and save the machine language on tape, then CLDADM it into your disk system later and type SAVEM "ZDNX", 13740, 16383, 13744 and press ENTER.

_//	
150104	89019
310 74	103041
440106	1170 123
600 255	1300 166
75026	END238

The listing: ZONX

1Ø CLEAR 2ØØ,137ØØ

15 CLS:PRINT:PRINT"LOADING MACHI

NE CODE ..."

2Ø X=13744

3Ø READ A:IF A<>999 THEN POKE X, A:X=X+1:GOTO 3Ø

35 FOR X=15872 TO 16383:POKE X,Ø:NEXT

5Ø T=6:FOR X=15891 TO 159Ø5 STEP 2:POKE X,T:POKE X+1,RND(255):T= T+1:NEXT X:POKE 159Ø7,13:POKE 15 9Ø8,RND(255)

6Ø PRINT:INPUT "READY RECORDER/PRESS ENTER"; A\$

7Ø CSAVEM "ZONX",1374Ø,16383,137

One-Liner Contest Winner . . .

Type this One-Liner in and you've added another "peripheral" to your CoCo system! (You may have to EDIT the line to get it all in.)

The listing:

1Ø V=9Ø:PMODE4:SCREEN1,1:PCLS:DR
AW"BM5Ø,12ØU12E1ØR4ØG1ØD12NL4ØM+
2Ø,-6U2ØNM-1Ø,+3L4ØM-1Ø,+3DR5G1Ø
D4R3ØU4E12L3ØM-4,+15":PAINT(68,9
9),1,1:FORX=75TO22ØSTEP.3:Y=SIN(
X/5)*15+V:LINE(X-1Ø,Y)-(X+2Ø,Y),
PSET:V=V-.14:IFX>1Ø8THENPRESET(X
-1Ø,Y+14.4):NEXT:RUNELSENEXT

Russ Rowgo Kalamazoo, MI

(For this winning one-liner entry, the author has been sent copies of *The Rainbow Book Of Simulations* and its companion *Rainbow Simulations Tape.*)

44 8Ø END 100 DATA 134,85,183,0,113,142,53 ,187,191,Ø,114,18,134,62,31,139 11Ø DATA 142,53,218,191,1,13,134 ,53,183,255,3,28,239,189,169,118 12Ø DATA 16,223,1Ø,16,2Ø6,63,255 ,126,56,162,182,255,2,12,Ø,59 13Ø DATA 13,12,16,38,1,191,182,2 55,32,31,137,132,3,138,128,183 14Ø DATA 255,32,182,255,Ø,247,25 5,32,214,18,132,128,38,3,90,42 15Ø DATA 7,92,193,62,35,2,214,18 ,215,1,142,12,64,214,18,84 16Ø DATA 58,236,132,221,14,134,8 ,16,142,Ø,Ø,16,175,132,48,136 17Ø DATA 32,74,38,247,134,255,15 1,8,142,12,64,214,1,215,18,84 18Ø DATA 58,37,46,15,15,134,24,1 48,8,167,136,32,134,6Ø,148,8 19Ø DATA 167,136,64,167,136,96,1 34,219,148,8,167,137,Ø,128,167,1 2ØØ DATA Ø,16Ø,167,137,Ø,192,134 ,195,148,8,167,137,Ø,224,126,54 21Ø DATA 214,2Ø4,1,128,148,8,212 ,8,237,136,32,204,3,192,148,8 22Ø DATA 212,8,237,136,64,237,13



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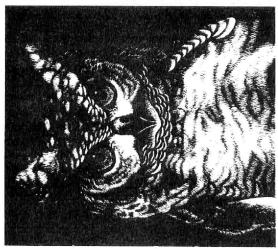
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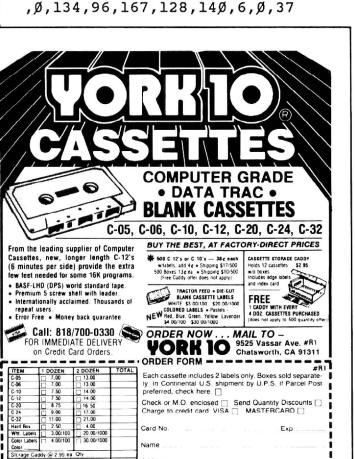
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64Ø DATA 249,16,142,4,32,142,58, 126,189,56,2ØØ,16,142,4,96,189 65Ø DATA 56,2ØØ,16,142,4,2Ø3,189 ,56,2ØØ,142,62,82,16,142,4,237 66Ø DATA 141,25,142,62,87,16,142 ,5,45,141,16,142,4,Ø,166,132 67Ø DATA 136,64,167,128,14Ø,6,Ø, 37,245,32,31,95,16,191,Ø,136 68Ø DATA 31,155,166,133,139,48,1 73,159,16Ø,2,92,193,5,37,243,134 69Ø DATA 48,173,159,16Ø,2,134,62 ,31,139,57,182,255,Ø,132,1,39 7ØØ DATA 249,126,59,75,142,54,23 3,159,79,15,16,79,151,81,151,12 71Ø DATA 167,226,68,151,77,189,5 5,119,189,54,177,189,53,224,173, 159 72Ø DATA 62,79,166,224,76,38,233 ,142,6,Ø,15Ø,78,151,81,175,227 73Ø DATA 189,55,119,189,54,177,1 89,53,224,13,12,38,20,220,14,39 74Ø DATA 16,132,1Ø2,196,1Ø2,16,1 31,0,0,39,4,12,13,32,2,12 75Ø DATA 12,173,159,62,79,174,22 5,48,31,38,211,79,151,81,167,226 76Ø DATA 68,151,77,189,55,119,18 9,54,177,189,53,224,173,159,62,7 77Ø DATA 166,224,74,38,233,57,14 2,55,251,159,79,15,17,126,57,123 78Ø DATA 142,58,Ø,159,79,15,17,1 5,16,15,74,15,75,126,57,123 79Ø DATA 189,54,233,189,55,251,1 3,12,38,1Ø,13,13,38,6,134,3 8ØØ DATA 151,73,151,76,57,134,1, 151,78,189,61,21,189,61,138,142 81Ø DATA 62,37,15Ø,78,139,3,72,4 8,134,159,53,142,62,55,48,134 82Ø DATA 159,71,189,57,116,189,5 7,23Ø,189,57,24Ø,189,59,217,134, 255 83Ø DATA 151,7,189,61,138,15Ø,78 ,76,151,78,129,5,37,2Ø9,1Ø,78 84Ø DATA 32,2Ø5,129,3,16,38,2,38 ,214,74,92,196,63,215,74,38 85Ø DATA 9,214,75,9Ø,39,4,196,12 7,215,75,214,75,219,74,15Ø,77 86Ø DATA 72,189,55,152,214,74,21 9,75,79,189,55,152,32,218,32,32 87Ø DATA 32,32,32,32,32,32,32 ,6Ø,6Ø,4Ø,4Ø,9Ø,79,78,88 88Ø DATA 41,41,62,62,Ø,32,32,32, 32,32,32,32,32,66,89,32 89Ø DATA 68,65,86,73,68,32,66,73 ,76,76,69,78,13,32,32,32 9ØØ DATA 32,32,8Ø,82,69,83,83,32 ,66,85,84,84,79,78,32,84 91Ø DATA 79,32,66,69,71,73,78,Ø,

76,65,83,84,32,83,67,79

3.50 City

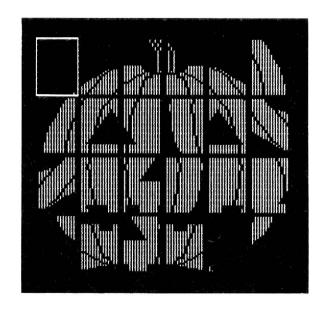
92Ø DATA 82,69,13,13,32,32,32,32 ,32,32,32,32,32,32,32,72 93Ø DATA 73,71,72,32,83,67,79,82 ,69,Ø,151,1,151,2,215,3 94Ø DATA 134,252,151,77,15,Ø,134 ,4,167,226,15Ø,77,214,1,141,64 95Ø DATA 79,214,1,141,59,1Ø6,228 ,38,241,134,4,167,228,15Ø,77,214 96Ø DATA 2,141,45,79,214,2,141,4 Ø,1Ø6,228,38,241,166,224,15Ø,Ø 97Ø DATA 145,3,36,38,15Ø,77,39,3 ,74,151,77,15Ø,1,129,255,39 98Ø DATA 3,76,151,1,15Ø,2,129,1, 39,3,74,151,2,126,58,246 99Ø DATA 183,255,32,9Ø,18,18,18, 18,38,249,57,142,59,133,166,128 1ØØØ DATA 39,249,23Ø,128,129,1,3 8, 18, 16, 142, 4, 46, 166, 164, 138, 64 1Ø1Ø DATA 167,16Ø,16,14Ø,4,5Ø,37 ,244,134,1,189,58,234,16,142,4 1Ø2Ø DATA 46,166,164,132,191,167 ,16Ø,16,14Ø,4,5Ø,37,244,182,255, 1Ø3Ø DATA 133,1,38,2Ø2,57,8Ø,16, 16,16,1,16,32,32,16,16,1 1Ø4Ø DATA 16,8Ø,16,8Ø,16,16,16,1 ,16,32,32,16,16,1,16,8Ø 1Ø5Ø DATA 16,64,32,1,16,64,16,64 ,32,1,16,48,16,64,32,1 1Ø6Ø DATA 16,64,16,64,32,1,16,48 ,16,8Ø,16,16,16,1,16,32 1Ø7Ø DATA 32,16,16,1,16,8Ø,16,8Ø ,16,16,16,1,16,16,16,16 1Ø8Ø DATA 16,16,16,1,16,1,16,Ø,Ø ,134,1Ø,214,78,61,231,226 1Ø9Ø DATA 166,228,198,8,189,58,2 34,189,6Ø,162,189,6Ø,182,189,55, 64 11ØØ DATA 189,61,138,1Ø6,228,38, 233,53,2,142,60,20,166,128,16,39 111Ø DATA 255,72,68,23Ø,128,189, 58,234,52,16,189,55,64,189,61,13 112Ø DATA 53,16,32,232,1,255,144 ,32,144,32,144,32,144,32,144,16 113Ø DATA 128,48,144,16,128,48,1 44,16,128,16,80,16,96,32,80,16 114Ø DATA 8Ø,16,8Ø,16,144,16,128 ,16,2,32,144,16,128,16,2,32 115Ø DATA 144,16,128,16,8Ø,16,96 ,144,0,0,150,13,129,1,38,21 116Ø DATA 15Ø,73,151,76,134,4,15 1,73,151,13,134,232,183,255,34,1 89 117Ø DATA 6Ø,162,126,6Ø,182,15Ø, 13,139,64,151,13,36,16,15,13,204 118Ø DATA Ø,Ø,221,14,15Ø,76,151, 73,134,248,183,255,34,57,129,4 119Ø DATA 16,38,25Ø,251,15Ø,13,6

4,72,138,128,214,13,189,55,152,7 12ØØ DATA 214,13,189,55,152,32,2 37,15Ø,86,76,151,86,129,1Ø,37,21 121Ø DATA 15,86,142,62,82,198,3, 166,133,76,167,133,129,10,37,5 122Ø DATA 111,133,9Ø,42,242,57,1 42,62,82,198,4,16,142,15,112,166 123Ø DATA 133,2Ø6,6Ø,227,72,72,1 71,133,51,198,134,5,151,1,16,159 124Ø DATA 2,166,192,167,165,49,1 68,32,1Ø,1,38,245,16,158,2,9Ø 125Ø DATA 42,221,57,3,51,51,51,3 ,15,207,207,207,3,3,243,3 126Ø DATA 63,3,3,243,195,243,3,5 1,51,3,243,243,3,63,3,243 127Ø DATA 3,3,63,3,51,3,3,243,24 3,243,243,3,51,3,51,3 128Ø DATA 3,51,3,243,243,142,4,Ø ,111,128,14Ø,14,Ø,37,249,134 129Ø DATA 255,167,128,14Ø,16,Ø,3 7,249,142,255,192,111,Ø,111,2,11 13ØØ DATA 5,134,248,183,255,34,1 6,142,15,113,142,62,82,198,4,189 131Ø DATA 6Ø,191,189,6Ø,182,142, 61,113,16,142,15,111,16,159,1,16 132Ø DATA 142,15,1Ø6,189,61,87,5 7,52,32,198,5,166,128,152,7,167 133Ø DATA 164,49,168,32,9Ø,38,24 4,53,32,49,33,16,156,1,38,231 134Ø DATA 57,6Ø,192,48,12,24Ø,6Ø ,192,192,192,6Ø,48,2Ø4,2Ø4,2Ø4,4 135Ø DATA 24Ø,2Ø4,24Ø,2Ø4,2Ø4,25 2,192,24Ø,192,252,142,61,21Ø,16, 142,14 136Ø DATA 44,52,32,198,8,215,6,1 66,128,141,42,215,3,141,38,15Ø 137Ø DATA 3,221,1,68,84,154,1,21 8,2,148,7,212,7,136,255,2ØØ 138Ø DATA 255,237,164,49,168,32, 10,6,38,221,53,32,49,34,16,140 139Ø DATA 14,52,37,2Ø5,57,198,4, 215,1,95,72,89,89,1Ø,1,38 1400 DATA 249,57,254,4,8,16,32,6 4,128,254,124,130,130,130,130,13 141Ø DATA 13Ø,124,13Ø,13Ø,162,14 6,146,138,13Ø,13Ø,13Ø,13Ø,68,4Ø, 4Ø,68 142Ø DATA 13Ø,13Ø,65,82,48,5Ø,54 ,18Ø,15Ø,83,84,65,82,48,52,54 143Ø DATA 2Ø5,134,83,84,65,82,88 ,5Ø,54,219,148,76,73,7Ø,69,6Ø 144Ø DATA 999 145Ø DATA 6,161,7,24,8,154,9,17, 1Ø,238,11,16,12,1,13,62,13,153,9 99



Have a little Halloween fun with . . .

The CoCo Puzzle Maker



By Fred B. Scerbo Rainbow Contributing Editor

Editor's Note: If you have an idea for the "Wishing Well," submit it to Fred c/o THE RAINBOW. Remember, keep your ideas specific, and don't forget that this is BASIC. All programs resulting from your wishes are for your use but remain the property of the author.

our years ago, back when THE RAINBOW was still a photocopy publication of about a dozen or so pages, I submitted my first program to Lonnie Falk for use in his new publishing venture. The program, Zelda's Bat Bottle, was a simple arcade-style graphics game with a Halloween theme. Bats would circle above a witch's boiling kettle while she tried to zap them into her bottle with bolts from her magic wand.

Fortunately, that game was the start of a very long friendship I have enjoyed with THE RAINBOW staff, although our contacts are usually restricted to phone conversations or a RAINBOWfest encounter. Now, some four years down the road, "Wishing Well" is in full swing on a monthly basis, and I am still having as much fun creating new programs as I was with the original Zelda game.

With all this in mind, the thought occurred to me that it might be time to create another Halloween game for the October issue. I toyed for a few days with the concept of creating a game called Peter, Peter, Pumpkin Eater,

(Fred Scerbo is a special needs instructor for the North Adams Public Schools. He holds a master's in education and has published some of the first software available for the Color Computer through his software firm, Illustrated Memory Banks.)

but no matter how hard I tried, the program kept looking too much like *Pac-Man* or my own *Snail's Revenge*. Some ideas even surfaced for Zelda II, but none seemed to catch my fancy. Over and over again, I kept coming back to the idea of doing something with a pumpkin, while at the same time not making it something limited to the month of October only. Deadline was approaching; what could I do?

The Wish

I took another look over my recent mail. A consistent pattern was always visible: People liked games, but they also like programs that could teach something. Most of all, readers indicated that they usually got the most out of programs they could alter, with my instructions, to include things they would create. After much thought, I came up with a program that would include all of this and still fit into my plans for a special Halloween program. The result is the CoCo Puzzle Maker, written for 32K Extended Color BASIC.

The Program

Like a puzzle you would buy in a box or find printed in the pages of a magazine, CoCo Puzzle Maker jumbles an image on the screen that the user must reassemble. To fit the Halloween spirit, the image I have chosen is a bright, smiling jack-o'-lantern. Every time the program is run, the puzzle will be jumbled in a different way. Each square of the puzzle on the grid will at some point be surrounded by a flashing square. The square may be moved around the screen using the right- and left-arrow keys on the keyboard.

When the flashing box surrounds a piece you wish to move, press the ENTER key and the image in the box will vanish. Use the keys to position the square over another section where you may want to put the piece selected. Position it where you wish and press ENTER again. That piece will vanish and then the two pieces will have exchanged places.

Continue to move pieces around the screen until you have assembled the image the way it should look. When the puzzle is complete, press the letter 'S' and the screen will clear and tell you how many minutes it took to complete the puzzle.

At this point you may either press 'P' to view the puzzle picture without the grid lines, or press 'R' to run the program again and try for a better time. When you view the completed puzzle, pressing ENTER will return to the text menu.

Sound simple? Well, while the concept is simple, you will be amazed at how tricky it is to complete the puzzle quickly. On first running the program, you will notice the screen is either red or blue. If the screen is not red, press Reset and run again until the screen is red. When it is red, press ENTER to start the program. (I used this method rather than the type used in last month's column since some of you may wish to use your own graphics for the puzzle and this is a more consistent method to use.)

Creating Your Own

2

3 1 *

Here's where the beauty of CoCo Puzzle Maker comes in. I have left considerable space between the start of the program and the actual puzzle routines for you to draw your own picture to use within the puzzle. Those who have Graphicom, CoCo Max or one of the other graphics programs available could also use graphics created with these and merge them with Puzzle Maker according to whatever instructions those programs give to merge your graphics with BASIC programs.

Let's say you simply wish to draw graphics using Extended Color BASIC commands. In that case, place your lines between the numbers 200 and 1999 for the drawing. You may delete my graphics by typing DEL210-1999 and pressing ENTER. Now, enter the following lines to create a concentric circle puzzle:

210 CLS0:PMODE4,1:PCLS0:SCREEN0,0 220 FORI=1 TO 100 STEP8 230 CIRCLE(128,96),I,1,.9 240 NEXTI

Believe it or not, the puzzle you create with these few lines will be very challenging to solve. Even I have had

THE CO-CO PUZZLE MAKER

BY FRED B. SCERBO

difficulty with it, so if you try it, you will see that this program can be for almost any age level, depending on how difficult the design is. If you really want it to be a challenge, change Line 220 to this:

220 FORI=1 TO 200 STEP4

That will really make the puzzle tough.

If you want to draw a simple design, try drawing the image outside the program starting with Line 210. To get an idea of the area the drawing should remain within, you may first wish to draw a box using the LINE command with the dimmensions:

```
LINE(32,32)-(224,160),PRESET,B
or
LINE(32,32)-(224,160),PSET,B
```

This gives you a square to draw your image within which the shape of the puzzle will fit.

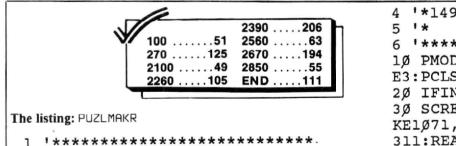
I chose not to use the full screen since some of you may make drawings which would leave too much blank space for the puzzle pieces. Also, some of the available graphics programs do not fill the whole screen because they use a border for the colors and keyboard commands. I think you will find this size fits those programs very well, but you will have to do the experimenting; I do not have any of those commercially available programs at my disposal. Judging from the artwork that has been submitted to the "CoCo Gallery," I am sure you will come up with some outstanding puzzle graphics. Please refer to the instructions of your graphics program to determine how to merge with other BASIC programs.

Conclusion and a Few More Points

You may now wonder what is educational about this. I firmly believe that using puzzles helps young students with logic skills. Molding this with the computer keyboard is only bound to help with those skills.

You will also notice the program does not tell if the completed picture is correct. Pressing 'S' only tells how much time it took to complete, not whether or not you got the picture done correctly. Adding that feature would have made the program a bit too long. As it is, I regret that I couldn't crunch this down into 16K, but it may give some of you an incentive to upgrade.

Also, be patient while the program draws the puzzle picture. It may take as long as a minute, but the program is working. Until next month, enjoy the pumpkin puzzle. Happy Halloween!



```
4 '*149 BARBOUR ST., N. ADAMS, MA*
5 '* COPYRIGHT (C) 1985 *
6 '*******************************
1Ø PMODE4,1:PCLSØ:SCREEN1,1:PMOD
E3:PCLS3
2Ø IFINKEY$<>CHR$(13)THEN2Ø
3Ø SCREENØ, Ø:CLSØ:POKE1Ø7Ø, 2Ø:PO
KE1Ø71,8:POKE1Ø72,5:FORI=112ØTO1
311:READ A:POKEI,A+128:NEXT
4Ø PRINT@358," BY FRED B.SCERBO
";
```

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CU * BER

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SPACE SHUTTLE

NEW

SR-71

The first screen objective is to catch enough of Fisie's kisses (those Red Heart Shaped Things) to fill in the squares on the Sailorman's house. If you can time your punch just so, you can send the punching bag over to knock the bucket down and, with a little bit of luck, right on **Bigfatbadguy**'s head. This will give you a little (but not much) time to catch all those RHSTs.

You must avoid contact with Bigfatbadguy who is actively pursuing you. You must also be careful of Olduglyseawoman who will appear at higher difficulty levels to chuck empties at you. Either avoid the fliying bottles or punch them (with the fire button) to keep from being knocked into the water.

keep from being knocked into the water. The second screen objective is to collect enough notes to play Elsie a little love song. You may jump off and onto the other end of Pagguyeatinghamburger's teeterlotter to fly up a deck and even two decks if you manage to catch hold of Smartaleck-kid's grab handles. Time it right and away you go. The Third screen objective is to collect enough letters (thrown by Elsie's criss for H-EL-P) to complete a ladder all the way to the crow's nest where Elsie is calling you. Beware of the Crow, however, who thinks you are after her eggs!

On all screens, eating a can of collard greens (labeled "S" for Collard and grasped by punching the can just right) will give you amazing speed, strength and ability and allow you to send Bigfatbadguy into the drink with a single punch.

Save the villagers of Pendor! They

live in fear of Icarus, the blood

thirsty dragon. The dragon lives in

a cave, way up in the mountains.

The cave is a treasure chest, full

of gems and cashbags. The trail to

the cave is as menacing as Icarus

himself. You will have to secure the

necessary equipment to climb the rocks and cross the rivers and

chasms along the way. Be on the

lookout for enemies and barriers at

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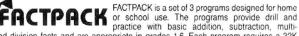
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SLAYER



plication and division facts and are appropriate in grades 1-6. Each program requires a 32K Extended BASIC Color Computer. Disk drive and printer are optional.

EDUCATIONAL

Requires 32 K Ext. Basic

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TEACHER'S DATABASE II

Teachers' Database (TDB) is a program designed to allow a teacher to keep a computerized file of information about his/her students.

The program requires a 64K Color Computer and at least one disk drive. This completely revised program includes all of the capabilities of the original TDB plus many new features

- Information on as many as 100 students, or more, may be in the computer at one time.
- Each student may have as many as 20, or more, individual items of data in his/her record.
- · The program has many easy to follow menus.
- · Records may be easily changed, deleted, or combined.
- Information about students may be numerical or text.
- · Records may be quickly alphabetized or reordered based on their contents.
- · Records may be sored by various criteria.
- · A full statistical analysis of scores may be done and sent to the printer.
- Student test scores may be weighted, averaged, changed to a percentage or changed to a letter grade.
- Individual student progress reports and class gradebook sheets may be printed.
- Three methods of data entry spped the task of typing in student grades and test results.
- · The program may be easily customized to work with any printer.
- · Student seating charts may be created and printed.
- Graphs of student test results may be created using the computer's high resolution graphic
- · Grade distribution can be displayed numerically or as a histogram.

Requires 32K Ext. Basic

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VOCABULARY MANAGEMENT

Requires 16K Ext. Basic or 32K for printer output.

The Vocabulary Management System (VMS) is a series of programs designed to aid a parent or teacher in helping children to learn and practice using vocabulary and spelling words. The 11 programs that comprise the VMS include a full feature data entry/edit program, three printer output programs and 5 vocabulary/spelling game programs. The system's many outstanding features include:

- · As many as 300 vocabulary words and definitions may be in the computer's memory at
- · Words and definitions may be saved on disk or tape.
- · Remarks and/or comments can be saved with word files
- · A disk loading menu allows students to load disk files without typing file names.
- · Word lists may be quickly alphabetized.
- · The three printer segments allow you to create and print individualized tests, puzzles, word-searches and worksheets.
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 Practice converting mixed numerals to mixed numerals.) Review converting mixed numerals to mixed numerals. (Used in regrouping in substraction).

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Definitions of terms and review of finding equivalent fractions.

2 Practice finding equivalent fractions.

Practice finding sets of equivalent fractions.
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MATH DUEL is a challenging mathematics game that pits you against the computer in a game of wits. You must use all of your knowledge of factors, multiples and prime numbers to develop a strategy that allows you tog ather more numbers and thus more points than the computer. The game is deceptively simple, you select the size of the playing field that is composed of from 8 to 100 numbers. You must then choose numbers that will give you the maximum number of points and the computer the least number of points. There are only 6 rules.

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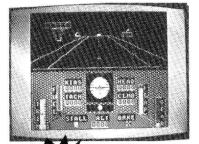
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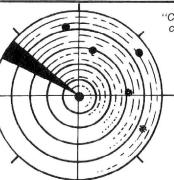
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21Ø PMODE4:PCLSØ:PMODE3:SCREENØ, Ø:JL=RND(-TIMER) 22Ø CIRCLE(112,1Ø2),76,3,.75,.29 ,.73:CIRCLE(144,1Ø2),76,3,.75,.7 8,.22 23Ø DRAW"BM128,52C3L8M-1Ø,-4UL1Ø BM128,52R8M+1Ø,-4UR1ØBM128,154L8 M-2Ø,+3BM128,154R8M+2Ø,+3" 24Ø DRAW"C3BM128,9ØG2ØR4ØH2ØBL2Ø L4ØE2ØF2ØBR4ØR4ØH2ØG2ØBM128,122L 6D6L12U6L12D6L12U6L2ØF12R4DR4DR4 DR8U4R12D4R12U4R12D4R12U4R12D4R8 UR4UR4UR4E12L2ØD6L12U6L12D6L12U6 L6" 25Ø PAINT(128,56),3,3:PAINT(128, 34),1,1 26Ø CIRCLE(128,1Ø2),76,1,.85,.35 ,.17:CIRCLE(128,1Ø2),58,1,.95:CI RCLE(128,1Ø2),3Ø,1,1.9 27Ø DRAW"BM122,5ØC2NR4U1ØH1ØR4F1 ØDlØR4UlØHlØR4FlØDlØL4" 2000 REM START PUZZLE HERE 2010 DIM A(25), B(25), C(25), D(25) E(25), F(25), G(25), H(25), I(25), J(25), K(25), L(25), M(25), N(25), O(25)5),P(25),Q(25),R(25),S(25),T(25) ,U(25),V(25),W(25),X(25)2Ø2Ø DIMGD(6,4),NN(24),MM(24),Z(

<u> Alffan Abailfte</u> Sister filtstellig

MARBLE MAZE



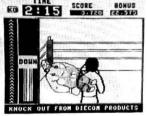
Move your marble around the mazes in your search for the finish line! Avoid the marble eaters, acid puddles and other creatures that inhabit the mazes. Avoid falling into holes or off the edges of the maze. Enter the MARBLE MAZE contest: the first five people to solve all the levels and identify the message and number win a free game from DIECOM PRODICTS!

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24),Y(24),AA(25),BB(25) 2Ø3Ø FORI=1TO4:FORY=1TO6:K=K+1:G D(Y,I)=K:NEXTY,I2Ø4Ø FORB=32T0128STEP32:FORA=32T O192STEP32:Q=Q+1:Z(Q)=A:Y(Q)=B:NEXTA, B 2Ø5Ø FORB=32TO128STEP32:FORA=32T 0192STEP32:T=T+1 2Ø6Ø ON T GOSUB2Ø8Ø,2Ø9Ø,21ØØ,21 10,2120,2130,2140,2150,2160,2170 ,218Ø,219Ø,22ØØ,221Ø,222Ø,223Ø,2 24Ø,225Ø,226Ø,227Ø,228Ø,229Ø,23Ø Ø,231Ø 2Ø7Ø NEXTA: NEXTB: GOTO232Ø 2Ø8Ø GET(A,B)-(A+31,B+31),A,G:RE TURN $2\emptyset9\emptyset \text{ GET}(A,B)-(A+31,B+31),B,G:RE$ TURN 21ØØ GET(A,B)-(A+31,B+31),C,G:RE TURN 211Ø GET(A,B)-(A+31,B+31),D,G:RE TURN $212\emptyset \text{ GET}(A,B)-(A+31,B+31),E,G:RE$ TURN 213Ø GET(A,B)-(A+31,B+31),F,G:RE TURN $214\emptyset$ GET(A,B)-(A+31,B+31),G,G:RE TURN 215Ø GET(A,B)-(A+31,B+31),H,G:RE TURN $216\emptyset \text{ GET}(A,B) - (A+31,B+31), I,G:RE$ TURN 217Ø GET(A,B)-(A+31,B+31),J,G:RE TURN 218Ø GET(A,B)-(A+31,B+31),K,G:RE TURN 219Ø GET(A,B)-(A+31,B+31),L,G:RE TURN $22\emptyset\emptyset$ GET(A,B)-(A+31,B+31),M,G:RE TURN 221Ø GET(A,B)-(A+31,B+31),N,G:RE TURN 222Ø GET(A,B)-(A+31,B+31),O,G:RE TURN 223Ø GET(A,B)-(A+31,B+31),P,G:RE TURN $224\emptyset \text{ GET}(A,B) - (A+31,B+31),Q,G:RE$ TURN $225\emptyset \text{ GET}(A,B) - (A+31,B+31),R,G:RE$ TURN 226Ø GET(A,B)-(A+31,B+31),S,G:RE TURN 227Ø GET(A,B)-(A+31,B+31),T,G:RE TURN 228Ø GET(A,B)-(A+31,B+31),U,G:RE TURN 229Ø GET(A,B)-(A+31,B+31),V,G:RE TURN 23ØØ GET(A,B)-(A+31,B+31),W,G:RE



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Note: Our Fourth Year Index, including an index to all editions of RAINBOW ON TAPE, is included in the July 1985 issue.

```
231Ø GET(A,B)-(A+31,B+31),X,G:RE
TURN
232Ø FORI=1T024
233Ø K=RND(24):IF NN(K)=1THEN233
234\emptyset NN(K)=1:MM(I)=K:NEXTI
235Ø PCLS2:LINE(21,21)-(234,17Ø)
, PRESET, BF
236Ø T=Ø:FORB=32TO128STEP32:FORA
=32TO192STEP32:T=T+1:L=MM(T)
237Ø ON L GOSUB24ØØ,241Ø,242Ø,24
30,2440,2450,2460,2470,2480,2490
,25ØØ,251Ø,252Ø,253Ø,254Ø,255Ø,2
56Ø,257Ø,258Ø,259Ø,26ØØ,261Ø,262
Ø,263Ø
238Ø LINE(A,B)-(A+31,B+31), PRESE
T, B: NEXTA, B
239Ø TIMER=Ø:GOTO264Ø
24ØØ PUT(A,B)-(A+31,B+31),A,PSET
: RETURN
241Ø PUT(A,B)-(A+31,B+31),B,PSET
: RETURN
242Ø PUT(A,B)-(A+31,B+31),C,PSET
: RETURN
243Ø PUT(A,B)-(A+31,B+31),D,PSET
: RETURN
244Ø PUT(A,B)-(A+31,B+31),E,PSET
: RETURN
245Ø PUT(A,B)-(A+31,B+31),F,PSET
: RETURN
246Ø PUT(A,B)-(A+31,B+31),G,PSET
: RETURN
247Ø PUT(A,B)-(A+31,B+31),H,PSET
: RETURN
248Ø PUT(A,B)-(A+31,B+31),I,PSET
: RETURN
249Ø PUT(A,B)-(A+31,B+31),J,PSET
: RETURN
25ØØ PUT(A,B)-(A+31,B+31),K,PSET
: RETURN
251Ø PUT(A,B)-(A+31,B+31),L,PSET
: RETURN
252Ø PUT(A,B)-(A+31,B+31),M,PSET
: RETURN
253Ø PUT(A,B)-(A+31,B+31),N,PSET
: RETURN
254Ø PUT(A,B)-(A+31,B+31),O,PSET
: RETURN
255Ø PUT(A,B)-(A+31,B+31),P,PSET
: RETURN
256Ø PUT(A,B)-(A+31,B+31),Q,PSET
: RETURN
257Ø PUT(A,B)-(A+31,B+31),R,PSET
: RETURN
258Ø PUT(A,B)-(A+31,B+31),S,PSET
: RETURN
259Ø PUT(A,B)-(A+31,B+31),T,PSET
: RETURN
```

TURN

CARD# .

SIGNATURE

EXPIRATION DATE ___

26ØØ PUT(A,B)-(A+31,B+31),U,PSET
:RETURN
261Ø PUT(A,B)-(A+31,B+31),V,PSET
:RETURN
262Ø PUT(A,B)-(A+31,B+31),W,PSET
:RETURN
263Ø PUT(A,B)-(A+31,B+31),X,PSET
:RETURN
264Ø PMODE4,1:SCREEN1,1:Z=1:QQ=Ø
:RR=Ø
265Ø X\$=INKEY\$:LINE(Z(Z),Y(Z))-(
Z(Z)+31,Y(Z)+31),PSET,B:IFX\$=CHR
\$(8)THEN268ØELSEIFX\$=CHR\$(9)THEN
269Ø
266Ø IFX\$="S"THEN288ØELSEIFX\$=CH
R\$(13)THEN271Ø



2670 LINE(Z(Z),Y(Z))-(Z(Z)+31,Y(Z))Z)+31), PRESET, B:GOTO265Ø 268 \emptyset P=Z:Z=Z-1:IFZ= \emptyset THENZ=24:GOT O27ØØ:ELSE27ØØ 269Ø P=Z:Z=Z+1:IFZ=25THENZ=1 2700 LINE(Z(P),Y(P))-(Z(P)+31,Y(P)+31), PRESET, B: GOTO265Ø $271\emptyset \text{ GET}(Z(Z),Y(Z))-(Z(Z)+31,Y(Z))$)+31), AA, G: LINE(Z(Z), Y(Z)) - (Z(Z))+31,Y(Z)+31),PSET,BF 272Ø QQ=Z 273Ø X\$=INKEY\$:LINE(Z(Z),Y(Z))-(Z(Z)+31,Y(Z)+31), PSET, B:IFX\$=CHR \$(8) THEN276ØELSEIFX\$=CHR\$(9) THEN 278Ø 274Ø IFX\$="S"THEN288ØELSEIFX\$=CH R\$(13)THEN281Ø 2750 LINE(Z(Z),Y(Z))-(Z(Z)+31,Y(

Z)+31), PRESET, B:GOTO273Ø 276Ø P=Z:Z=Z-1:IFZ=QQ THENZ=Z-1 277Ø IFZ=ØTHENZ=24:GOTO28ØØ:ELSE 2800 278Ø P=Z:Z=Z+1:IFZ=OO THENZ=Z+1 279Ø IFZ=25THENZ=1 2800 LINE(Z(P),Y(P))-(Z(P)+31,Y(P)+31), PRESET, B: GOTO273Ø 281Ø IFZ=QQ THEN273ØELSE GET(Z(Z (X,Y(Z)) - (Z(Z) + 31, Y(Z) + 31), BB, G:LINE(Z(Z),Y(Z))-(Z(Z)+31,Y(Z)+31), PSET, BF 282Ø RR=Z 283Ø L=MM(RR) 284Ø PUT(Z(RR),Y(RR))-(Z(RR)+31, Y(RR)+31), AA, PSET: LINE (Z(RR), Y(R)R))-(Z(RR)+31,Y(RR)+31),PRESET,B2850 L=MM(QQ) 286Ø PUT(Z(QQ), Y(QQ)) - (Z(QQ)+31, Y(QQ)+31), BB, PSET: LINE(Z(QQ), Y(QQ))-(Z(QQ)+31,Y(QQ)+31),PRESET,B287Ø TY=Ø:GOTO264Ø 288Ø CLS:SCREENØ,Ø:TD=TIMER:SC=I NT(TD/356):MN=SC/1Ø 289Ø CLS:SCREENØ,Ø:PRINT@132,"YO U TOOK "MN" MINUTES. " 2900 PRINT@196, "PRESS <P> FOR PI CTURE." 291Ø PRINT@26Ø,"PRESS <R> TO RUN 292Ø X\$=INKEY\$:IFX\$="P"THEN293ØE LSEIFX\$="R"THEN RUN3Ø ELSE291Ø 293Ø PMODE4,1:PCLS1:SCREEN1,1:PM ODE3:PCLS2:T=Ø:FORB=32TO128STEP3 2:FORA=32TO192STEP32:T=T+1 294Ø ON T GOSUB24ØØ,241Ø,242Ø,24 3Ø,244Ø,245Ø,246Ø,247Ø,248Ø,249Ø ,25ØØ,251Ø,252Ø,253Ø,254Ø,255Ø,2 56Ø,257Ø,258Ø,259Ø,26ØØ,261Ø,262 Ø,263Ø 295Ø NEXTA,B 296Ø X\$=INKEY\$:IFX\$=CHR\$(13)THEN 289ØELSE296Ø

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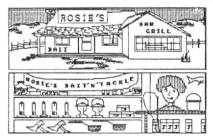
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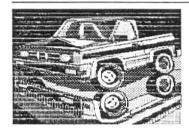
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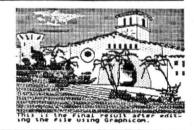




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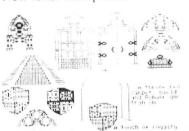
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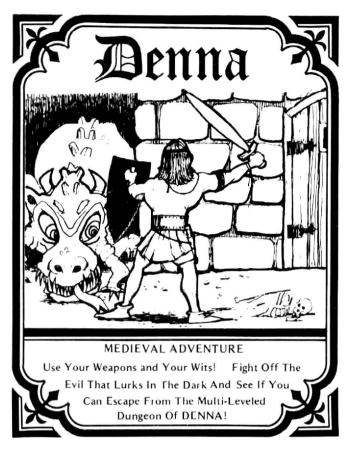
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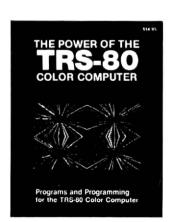


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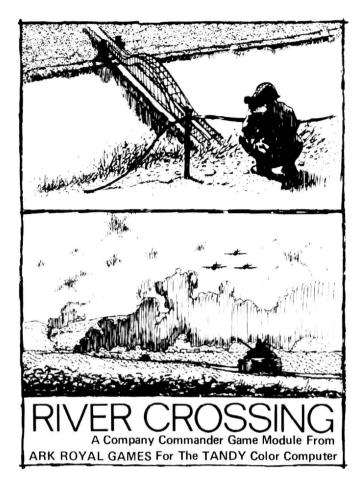


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A Final Session With The 'A' Option

By Joseph Kolar Rainbow Contributing Editor

reating graphics on CoCo is so rewarding and the possibilities so endless. To prove the point, we are going to have one final session using the 'A' option of DRAW. Considering that we have limited ourselves to utilizing a single design element, we have come a long way, baby! As a beginner, you realize the door being opened for you has countless avenues to explore. The only limitation is the depth of your imagination.

You are urged to ask yourself questions while proceeding through this tutorial. Make a note of them and later pursue these byways; you never know where they will lead. Rest assured you will have learned something.

Turn on your best friend, CoCo, and from Listing 1 key in lines 0 through 40 and 500. A\$ and C\$ design units are the same ones you used previously. Perhaps we are in a rut, however, these units are ideal to demonstrate the scope of the 'A' option.

Our project for today is to create a display using the eight possible orientations, radiating from a single, central

point (LHUERFDG). They will be displayed one at a time and then erased. We will put them in an endless loop and attempt to give the display a feeling of motion.

Line 40 creates the horizontal design, A\$, radiating to the left from a central point. Note that you could have started in some other quadrant (orientation) of A\$. (You may want to explore this on your own.)

After you key in a line, RUN and study it; BREAK unless otherwise directed. You will get the maximum benefit by progressing slowly through this tutorial.

Key in Line 50. CoCo did not require any new or additional information, so it added C\$ to the display. Key in Line 60. The only new information CoCo needed to know was the new orientation, "A1." Key in Line 70. It is similar to Line 50, serving the same purpose.

LIST and look over what you have worked up. Without referring to Listing 1, create and key in the four design units needed to display all eight orientations. They will be designated as lines 80, 90, 100 and 110.

Note that the diagonal units begin at the central starting location. We prefer to back off three units from the central point to give the entire display a twist to the right. In Line 20, insert after the opening quotation mark ("), BL3. In Line 30, insert BH3. Now the design elements appear to rotate like a whirligig.

Frankly, backing off three units from the central point is a time-consuming project and must be given as information changes to CoCo in lines 40-110. You may want to work it out on your own. If you want to puzzle it out (and it is worth doing), after deleting BL3 from Line 20 and BH3 from Line 30, make a CSAVE "PUZZLE" and set it aside to work on later.

Our next step is to remove each item, one at a time, in the same order that we displayed them. Key in Line 120. We used C0 to inform CoCo of our wish to blank out A0 of A\$. In the two-color PMDDE4, use either C0, C2 or C4 to blank out the design. Try them all and see! You may prefer to use only the C0.

You must have figured what Line 130 should read to erase the first diagonal — key it in! Then key in the rest of the lines, 140 through 190. You will notice the display was completed and then erased. To recycle it to continue indefinitely, key in Line 200. The only trouble is that nothing happens! Why?

Notice that in Line 40 no 'C' color ption is given. CoCo knew it was C1 because, without instructions, it knew that it is the color you desired. It is the default option. CoCo is given a

(Joseph Kolar is a free-lance writer and programmer dedicated to proselytizing for computers in general, and the CoCo specifically.)

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color change in Line 120, C0. When it recycled back to Line 40, the last information regarding color that CoCo had was C0. It assumed there was no change and you see the net result. Nothing!

The solution is to edit Line 40, insert C1, or if you prefer, C3, right after the opening quotation mark ("). Now CoCo knows for sure that every time it reaches Line 40, C1 is demanded.

compare new results with previous ones; it is a good way to learn. The newcomer gets to know what to expect when he does this or that. Ask yourself "If I do this, it looks like this. If I do that, it looks like that. What is the difference? What did I change? How did it affect the display? Is this important information I want to squirrel away?" That is what the keys are for! Tickle them! CoCo won't get mad.

"The point is that a beginner should always try different values. Take time out to do so. Every try allows you to compare new results with previous ones; it is a good way to learn."

When in doubt, it is best to put all the required option information that CoCo may require, such as 'S' for size and 'C' for color, and since we are working with 'A', 'A' for angle orientation. Even if it is redundant, it won't detract from or affect the resultant display. As we progress, you will omit the extraneous instructions to CoCo.

We have a rapidly revolving whirligig. Suppose we wanted to slow it down. We could try putting pauses between each element displayed. First, let us try slowing down the part that draws the elements. Add Line 45: 45 FOR Z=1 TO 200: NEXT then RUN and press BREAK. You should put on a few more to get a better view. Key in lines 55, 65 and 75 to read the same as Line 45.

That is not too bad! Since we are going to require many pause lines, we might as well create a GDSUB routine. Key in 600 FDR Z = 1 TO 200: NEXT: RETURN. Re-key Line 45 to read 45 GDSUB 600. If it is OK, re-key lines 55, 65 and 75. Key in required lines 85, 95, 105 and 115 (all GDSUB 600).

It looks neat! You might like to change the value in Line 600 (200) to see if a longer or shorter pause appears to be more effective. Using a value of 300 provides more time to study the display as the elements are augmented. A value of 100 or less (to about 30) gives a better sense of speed. It is up to you to choose a value. For the purposes of the tutorial, 200 will be used.

The point is that a beginner should always try different values. Take time out to do so. Every try allows you to

All these GOSUB lines could have been tacked on to the DRAW lines, separated by colons (:), to make multiple line statements. When you are in a mad frenzy of creativity, make separate lines. Why? It is easier to follow the listing and you may decide to add additional items to the DRAW lines.

It is easier to edit short program lines. Also, errors are easier to spot. There is plenty of time when the program is finalized to make it more elegant by tightening it up: removing unnecessary or redundant program lines and/or making multiple-line statements.

There is no sense in putting GOSUB routines between the erased units in lines 120-190. The only effect would be additional pauses that would cumulatively become one long, additional pause. Who wants to look at a blank screen?

Suppose we added four A\$ units, size S4, to give the display more body? Add +"S4"+A\$ to lines 40, 60, 80 and 100. Uh oh! Before we go any further, let's change the size to S12 and RUN. It is too large! Let's try S10.

Note: Usually only S4, S8, S12 and S16 will work properly when diagonal lines H, E, F and G are used to create a design. The figures will become distorted. Coincidentally, the designs we created, A\$ and C\$, have proportional lines in even number of units, 2, 4, 6 and 8, and the geometrical relationship did not suffer.

Let's take time out to illustrate this point. Copy from Listing 1 lines 15, 700 and 710 but omit the REM markers. After running, try in succession S13 to S16. You will get varied degrees of distor-

tion. The more diagonals, the more distortion. The rule is play it safe. Use sizes beginning with S4 and increment upwards to larger sizes by +4.

Make lines 15, 700 and 710 REM lines by inserting an apostrophy (') at the beginning of each line. Back to the drawing board!

Add to Line 40 + "S10"+A\$+"S8". The S10 increases the size and A\$ prints this larger design element over the smaller one. S8 maintains the size of the diagonal element, C\$, in the following line without disturbing it.

Make the same additions to lines 60, 80 and 100. In order to make the blanking lines, 120, 140, 160 and 180, erase these additional design units and add +"S10"+A\$+"S8" to them.

The design is off-center due to the insinuation of the larger size. Adjust this by changing the BM128,96 part of the instructions to CoCo in Line 40 to BM138,106. The design is swept off the screen very nicely, but the placing of the units is jerky; adjust Line 600. Use a value of about 30 or 40 to get a rapid, yet smooth rotation.

Just to see what happens, remove the BL3 from Line 20 and BH3 from Line 30. It's OK but it must be recentered by changing the BM values in Line 40 to the original BM128,96.

Could we add four S4-sized units to the A\$ elements? Change the S8 at the end of the Line 40 to +"S4" and add +A\$+"S8". This adds a small unit to the first horizontal orientation. Make the same changes in the other three orientations at lines 60, 80 and 100. That looks good enough. The S4 units add interest to the display as it is created. Not erasing it enhances the grand design.

Just in case it looks better blanked out, modify lines 120, 140, 160 and 180 by changing S8 to S4 and adding +A\$+"S8". Check it out! If you like this result, CSAVE it. If you prefer the other, readjust lines 120, 140, 160 and 180 and CSAVE. Remember to adjust the pause in Line 600 to some value that pleases you.

Out of curiosity, in lines 120, 140, 160 and 180 change S10 to S8 and delete the rest of the line. This is just another variation that erases only the S8 on both the A\$ and C\$ elements. CSAVE if you desire.

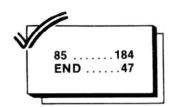
You could jazz up the diagonals by adding to Line 50 + "S4"+C\$+"S8", etc. Or try this: Change the last A\$ in lines 40, 60, 80 and 100 to C\$. There is no end to what you can investigate.

You are encouraged to dream up things to add, remove or change. Take time out to try them all. Make this tutorial a springboard to further experimentation. If you play around, your endeavors may suggest unexpected avenues to explore.

Mentally, question everything you key in. Never be afraid to alter a program. You should always strive to modify a program, giving it your personal imprimatur. Create your own designs on graph paper and even substitute them for the designs in lines

20 and 30. You will be fascinated at the startling designs you create. Are you still sure you're a beginner?

Let me leave you with a challenge. Display and remove each design element in turn. It won't prove anything in particular, but who knows?



Listing 1: RADIALS

- Ø 'LISTING1
- 5 CLEAR5ØØ
- 1Ø PMODE4,1:PCLS:SCREEN1,1
- 15 'GOTO7ØØ
- 2Ø A\$="H2L2G6L8H6L2G2F2R2E6R8F6R
- 2E2" HORIZONTAL ORIENTATION
- 3Ø C\$="U2H2L6H8U6H2L2D2F2R6F8D6F
- 2R2"'DIAGONAL ORIENTATION
- 4Ø DRAW"ClAØS8BM128,96"+A\$+"S1Ø"
- +A\$+"S4"+A\$+"S8"
- 45 GOSUB6ØØ
- 5Ø DRAW+C\$
- 55 GOSUB6ØØ
- 6Ø DRAW"A1"+A\$+"S1Ø"+A\$+"S4"+A\$+
- "S8"
- 65 GOSUB6ØØ
- 7Ø DRAWC\$
- 75 GOSUB6ØØ
- 8Ø DRAW"A2"+A\$+"S1Ø"+A\$+"S4"+A\$+
- "S8"
- 85 GOSUB6ØØ
- 9Ø DRAWC\$
- 95 GOSUB6ØØ
- 100 DRAW"A3"+A\$+"S10"+A\$+"S4"+A\$ +"S8"
- 1Ø5 GOSUB6ØØ
- 11Ø DRAWC\$
- 115 GOSUB6ØØ
- 12Ø DRAW"AØCØ"+A\$+"S1Ø"+A\$+"S8"
- 13Ø DRAWCS
- 14Ø DRAW"A1"+A\$+"S1Ø"+A\$+"S8"
- 15Ø DRAWC\$
- 16Ø DRAW"A2"+A\$+"S1Ø"+A\$+"S8"
- 17Ø DRAWC\$
- 18Ø DRAW"A3"+A\$+"S1Ø"+A\$+"S8"
- 19Ø DRAWC\$
- 2ØØ GOTO4Ø
- 500 GOTO500
- 6ØØ FOR Z=1TO 2ØØ:NEXT:RETURN
- 700 'DRAW"S12BM90,90U6R3FDGL2NLF
- 3BR4 HU4ER2FD4GNL2BR4 BUFR2EUHL2
- HUER2FBR3BU NR4D2NR3D4R4"
- 71Ø 'GOTO71Ø

Listing 2: DANCE

- 201 END238
- Ø 'DANCE 10 '(C) 1984, J.KOLAR
- 3Ø PMODE3:PCLS:PMODE4
- 4Ø A=164:B=1Ø2
- 5Ø DIM S(2),T(2),U(2),K(2),L(2)
- 6Ø DRAW"BM2, ØR4F2D4G2L4H2U4E2BFR
- 2F2D2G2L2H2U2E2"
- 66 DRAW"BM5Ø,4R8"
- 67 DRAW"BM2Ø,ØF8"
- 68 DRAW"BM7Ø,8E8"
- 69 DRAW"BM8Ø, ØBR4D8"
- $7\emptyset \text{ GET}(\emptyset,\emptyset) (8,8), T,G$
- 75 GET $(2\emptyset,\emptyset)$ -(28,8),S,G
- 76 GET $(5\emptyset,\emptyset)$ -(58,8),U,G
- 77 GET $(7\emptyset,\emptyset)$ -(78,8),K,G
- 78 GET $(8\emptyset,\emptyset)$ -(88,8),L,G
- 8Ø PCLS:SCREEN1,1
- 11Ø FOR Z=2ØØØTO 1946 STEP-9
- 111 FOR R=3Ø TO -8Ø STEP-5:C=Z
- $2\emptyset\emptyset X=INT(A-R*SIN(C-.83)):Y=INT($
- B-R*COS(C-.83))
- 212 SOUND5Ø,1
- 225 PUT(X-4Ø,Y-1Ø)-(X-32,Y-2),U,
- OR: FORM=1TO3Ø: NEXT
- 23Ø PUT(X-4Ø,Y-1Ø)-(X-32,Y-2),K,
- PSET: FORM=1T03Ø:NEXT
- 235 PUT $(X-4\emptyset,Y-1\emptyset)-(X-32,Y-2)$,S,
- OR: FORM=1TO3Ø: NEXT
- 24Ø PUT $(X-4\emptyset,Y-1\emptyset)-(X-32,Y-2),L$,
- PSET: FORM=1T03Ø: NEXT
- 245 PUT $(X-4\emptyset,Y-1\emptyset)-(X-32,Y-2)$,T,
- OR
- 25Ø NEXTR,Z
- 251 FOR R=9ØTO 9Ø STEP-2Ø:FOR Z=
- 412 TO 48 STEP-4:C=Z
- 252 X=INT(A-R*SIN(C)):Y=INT(B-R*
- $COS(C)):SOUND5\emptyset,1$
- 253 PUT $(X-4\emptyset,Y-1\emptyset)-(X-32,Y-2)$,T,
- PSET
- 254 PUT(X-4Ø,Y-1Ø)-(X-32,Y-2),T,
- NOT: NEXTZ, R
- 257 PLAY"V2503L8C02FEFE01B02CC V
- 1503L8C02FCFL16CFCC01BL802CEEC V 2503L8C02GEC01B02CFC V2503L803C0
- 2BBGL4EDL8EDL4EC01B02L2C"
- 300 FORX=1T02000:NEXT:PCLS:GOT08 Ø

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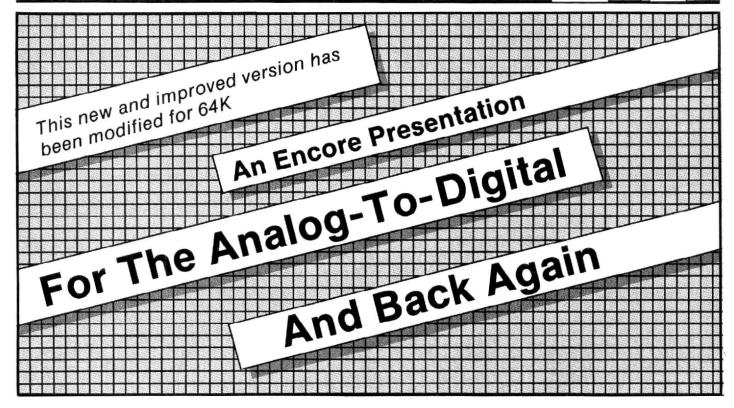
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By Stephen Gunn

fter seeing Jeremy Spiller's "Analog-to-Digital And Back Again" article (June 1985, Page 36), I just had to try it! I typed it in and it worked; the only problem was that it would only give about 13 seconds of sound. The program only used 32K, so I modified it for 64K.

The assembly language listing is rather short, so it has been modified. Also included are four routines for moving blocks of memory from the upper page of RAM into the lower page and back again, therefore the BASIC SAVEM and LOADM commands can be used.

How the New Program Works

The BASIC program no longer pokes the routine into memory, but loads it from disk (or cassette). This makes changing the assembly language routine easier. The BASIC program then sets a flag in RAM, so even if you press BREAK and then RUN the program again, it won't bother reloading the machine language routine. The BASIC program

(Stephen Gunn has had his computer for three years. He plans to enter college this fall and major in computer science.) also turns off the interrupts which allows for better sound quality.

You are presented with a menu similar to the old version's. Selection one is the same as in the original program. Selection two is different in that you can now also control the speed at which the tape is read in. Selecting a speed of one will give a higher sampling rate, hence better sound but less playing time (about 15 seconds). Selecting 15 as the speed will give much lower sound quality, but the playback time is 75 seconds, five times longer than the original program.

(One note: If you want something to sound the same when it plays back, select the same speed of playback as when it is read in. For example, if you read something in at the speed of 11, to have it sound the same it must play back at the speed of 11.)

Selection three is playback, same as in the original version. Selection four lets you save what is in memory to disk, but be warned that a disk will hold only two complete dumps from memory. The filename has to be seven characters or less because the program saves memory out in three files, adding the numbers '1', '2' and '3' to the filename given. After you save memory out, what

is in memory is more or less destroyed by the saving process, so to listen to the same file use Selection five to reload it. (Selection five loads files back into memory.)

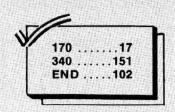
The modifications were created for a disk system, but I see no reason why they shouldn't work for cassette if you change all of the LOADMs to CLOADMs and all of the SAVEMs to CSAVEMs.

Loading Instructions

First, using an editor/assembler, type in and assemble the ML program. If you have a disk system and are using the cartridge EDTASM, assemble it to tape, then reconnect the disk controller and transfer it to disk. If you are using disk EDTASM, just assemble it to disk. Make sure you use the filename SOUND.

If you have the old BASIC version of Jeremy's program, you can just add my routines and changes to his program, otherwise you will have to type in the whole program (it isn't too long).

I enjoyed modifying A/D DRVR for 64K, and I hope you will enjoy using it! If you should have any questions regarding this new version, you may contact me at 944 Wisconsin, Oak Park, IL 60304. Please include an SASE.



Listing 1: 64KDRVR

Ø 'WHEN YOU SAVE A FILE, WHATEVER IS IN MEMORY IS RUINED BY THE SAVING PROCESS, SO THAT IF YOU WANT TO LISTEN TO THE FILE YOU JUST SAVED. YOU WILL HAVE TO RELOAD IT.

1Ø CLS:GOTO46Ø

2Ø CLEAR1ØØ, &H1AFF: POKE65283,52: IFPEEK(512) = ØTHENLOADM"SOUND": PO KE512,85

3Ø POKE65344,Ø

4Ø CLS

50 PRINT" ANALOG TO DIGITAL CON

VERTER"

6Ø PRINT" BY JEREMY SPILLER

MODIFIED FOR 64K 7Ø PRINT"

BY STEPHEN GUNN" 8Ø PRINT"

9Ø PRINT

100 PRINT"1. TEST VOLUME OF TAPE

RECORDER"

110 PRINT"2. READ TAPE (DIGITALI

ZE) "

120 PRINT"3. SAY DATA (PLAYBACK)

13Ø PRINT"4. SAVE DATA"

14Ø PRINT"5. LOAD DATA"

15Ø PRINT

16Ø INPUT" PICK A NUMBER"; A

17Ø ON A GOTO 19Ø,24Ø,29Ø,33Ø,39

18Ø GOTO 4Ø

19Ø CLS

200 PRINT"TO GET BACK TO MENU PR

ESS RESET THEN RUN THIS PROGRAM.

21Ø PRINT

22Ø PRINT"SET YOUR TAPE RECORDER

TO THE CORRECT VOLUME"

23Ø MOTORON: EXEC &H1B49

240 CLS:INPUT"TYPE A NUMBER 1-15 THE SPEED. TO CONTROL ENTER= DEFAULT OF 6. =>";S:IFS=Ø THEN S

25Ø IF S>15THEN24Ø

26Ø POKE&H1BØB+3,S

27Ø PRINT"READING TAPE": MOTORON:

EXEC &H1BØØ:MOTOROFF

28Ø GOTO4Ø

29Ø CLS:INPUT"TYPE A NUMBER 1-15

TO CONTROL THE SPEED. ENTER= DEFAULT OF 6. =>";S:IF S=Ø THEN

S=6

300 IF S>15 THEN290

31Ø CLS:PRINT"SAYING":POKE&H1B35

+3,S:EXEC &H1B25

32Ø GOTO4Ø

33Ø CLS:LINEINPUT"ENTER FILE NAM

E: ";A\$:IFLEN(A\$)>7THEN33Ø

34Ø PRINT"SAVING"

35ø SAVEM A\$+"1",&H1CØØ,&H7FFF,Ø

36Ø EXEC &H1B69:SAVEM A\$+"2",&H1

CØØ,&H7FFF,Ø

37Ø EXEC &H1B8Ø:SAVEM A\$+"3",&H1

CØØ,&H37ØØ,Ø

38Ø GOTO3Ø

39Ø CLS:LINEINPUT"FILE TO LOAD:

";A\$

400 PRINT"LOADING"

41Ø LOADM A\$+"3":EXEC&H1B97

420 LOADM A\$+"2":EXEC&H1BAF

43Ø LOADM A\$+"1"

44Ø GOTO3Ø

45Ø '*PCLEAR Ø*

46Ø POKE&H3CØ,&H5F:POKE&H3C1,&H5

47Ø POKE&H3C2,&H96:POKE&H3C3,&HB

48Ø POKE&H3C4, &H1F:POKE&H3C5, &HØ

49Ø POKE&H3C6,&H7E:POKE&H3C7,&H9

6: POKE&H3C8, &HA3

5ØØ EXEC &H3CØ

51Ø GOTO2Ø

Listing 2: SOUND

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ØØ12Ø * BY JEREMY SPILLER

ØØ13Ø * 1985

99149 ************* \$1BØØ

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1B17			99259		DECB	
1B18		F1	ØØ26Ø		BNE	TIME
1B1A		8Ø	99279		STA	,X+
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FOUR STAR SOFTWARE

* CoCo has the potential, we have the products, you have the power *

GALACTIC FIGHTER

A fast-paced arcade game with great graphics and sound. CoCo at its best!

Save earth by fighting your way to Dracoz. the home world of the invaders. Fly earth's secret weapon, 'The Galactic Fighter'. Overcome alien ships, missiles and meteor showers. Try and survive the deadly laser

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Explosive color, fast-moving animation and amazing sound make this non-violent game a classic! Different levels and more than FORTY screens offer as much challenge & good clean fun as you can take! Play solo or enjoy the challenge of two-player simultaneous competition. Scramble to get the loot first, but be careful: the KATS are prowling and your opponent is tossing eggs!

32K Tape \$27.95/Disk \$29.95



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by John Crane

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The RAINBOWfest Reporter

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Writers: Richard A. White and A. Buddy Hogan

Editor: Wayne Fowler

Prospect, KY

May 1985

Vol. 1, No. 2

Innovation, memory expansion mark RAINBOWfest-Chicago

CHICAGO, Ill. — More memory and more innovation sum up the major observations made at RAINBOWfest-Chicago. As we have come to expect, a large turnout of CoCo owners jammed around booths to be astounded by EARS, Colorburst, Thunder RAM and other innovations, or to take advantage of bargain prices on disk drives.

When not crowding into the exhibit room at the Woodfield Hyatt, attendees filled the seminar rooms to hear about topics ranging from speech recognition and spreadsheets to BASIC09 and OS-9.

Interest in OS-9 continued, with Dale Puckett autographing copies of his book *The Complete Rainbow Guide To*

OS-9 at THE RAINBOW booth. Unfortunately, sales were so brisk that the supply of books for sale ran out by noon Saturday.

Bare 51/4-inch disk drives sold for prices approaching \$100. One booth was offering a showonly special on a pair of Digital Equipment 51/4-inch drives in a case with power supply and cable for only \$249. It takes a show like RAINBOWfest to bring out the bargains.

Chicago treated us to perfect spring days — dry, sunny and comfortably cool. Many bought lunch from a sandwich bar set up by the hotel and ate sitting out on the lawn.

The next RAINBOWfest will be in Princeton, N.J., Oct. 11-13, 1985.



Over 11,000 people attended RAINBOWfest-Chicago.

New speech recognition system brings a glimpse of future



Rich Parry of Speech Systems exhibited EARS, a speech recognition system.

Far and away the most popular exhibit was the Speech Systems booth, which was displaying EARS, Electronic Audio Recognition System. This speech-recognition system consists of a microphone attached to a headset that is, in turn, attached to a hardware module, which plugs into the expansion port of the CoCo.

Designer Rich Parry explained in his seminar on speech recognition that only one year ago he had said it couldn't be done, but the introduction of a "miracle" speech chip has changed all that. EARS is actually a sound recognition system that is remarkably accurate (Parry says 95-98 percent). The accompanying software adds several

new commands to BASIC for system use.

The uses of such a system include the automatic control of external devices (particularly appreciated by the handicapped) and "communication" with a CoCo equipped with Super Voice or one of the other speech synthesizers. The limits are one's imagination.

At \$99.95, EARS brings capabilities to the CoCo that could not be purchased for \$10,000 a year ago. Industry and business applications of speech recognition are few and far between. This package allows the CoCo owner to experiment with and be in the forefront of another technology of the future.

Memory at 20 bytes per penny

Bob Rosen of Spectrum Projects introduced his 256K memory upgrade board, appropriately named *Thunder RAM*. They sold out so fast at \$119.95, we didn't even get a chance to see them.

Rosen says the upgrade, which is installed inside the CoCo, emulates a 40-track RAM disk that is 30 times faster than an ordinary floppy drive. It allows you to have a 60K print spooler, create BASIC programs up to 128K long or store up to 30 or more Hi-Res graphics screens in memory at one time. He described it accurately as "a major

breakthrough for the CoCo." This may just be the beginning, however, because Bob promised to keep his programming wizards hard at work over the summer.

Across the room, Dave Skrock of MAX-SYS Electronics and Software Company showed off the Colorburst System, offering up to one megabyte of RAM. Colorburst is a very attractive and sturdy external hardware device that plugs directly into the CoCo expansion port and contains six software selectable expansion ports and a disk controller connector in the back.

Options ranging from 64K to one megabyte cost from \$570 to \$999.

Colorburst memory is in addition to what you already have. The ROM in the unit has routines that will quickly access the extra memory, acting as a print spooler or a RAM disk. It operates with all versions of the CoCo and is OS-9 and Disk BASIC compatible. The unit even includes a parallel Centronics interface.

Both Thunder RAM and Colorburst are evolving products whose usefulness will increase as more software becomes available.

Odneal introduces 'portable' CoCo

Steve Odneal of P.R.O. Systems of Kansas City had passers-by doing double takes as they stared at what appeared to be a "portable" CoCo at his booth. Next to it sat a normal CoCo hooked up to a 10 megabyte, half-height hard disk drive ready to run under Disk BASIC, OS-9 or FLEX at the user's whim.

Odneal, a CoCo pioneer and former SysOp of the Kansas City CoCo BBS, told us he took a Commodore portable and "fixed it." And fix it he did. He took out all the insides, replaced them with CoCo 2 components and added a few touches of his own. The unit sports a 5-inch color monitor, two 51/4-inch floppy drives (it also will come with the 10-megabyte hard disk and one floppy drive), detachable keyboard with a 24-inch cord, front panel monitor control, and 64K Disk Extended BASIC.

The PCC (P.R.O.'s name for it) is compatible with all CoCo software since all standard functions and addresses were retained. Odneal's machine is a prototype. He will begin production only if there is enough interest from the CoCo Community. The estimated cost of the standard unit is approximately \$1,500. If interested, give Steve a call at (913) 631-0665 or write him at 10601 W. 63 Street, Shawnee, KS 66203.

The P.R.O. hard disk drive comes complete with case, power supply and necessary software for \$995. With the supplied drivers, the drive acts just like other drives under OS-9 or FLEX, except it's five times faster and holds lots of files.

Under Disk BASIC, the CoCo must be put into 64K mode with the ROMs copied into the upper 32K. Boot software patches Disk Extended BASIC and adds some system code. This creates no problem with BASIC programs, but there are conflicts where machine language programs are written to use the same memory space. Work is going forward on this problem, and Marty Goodman, of Graphicom fame, worked to "fix" Telewriter while RAINBOWfest was in progress.



Chip McGinnis (right) of P.R.O. Systems demonstrated his company's new PCC.

Sports statistics from Sugar Software



Susan Davis (center) announced at RAINBOWfest that she had moved Sugar Software to Hollywood, Fla.

Susan Davis introduced the Sports Statistics Package for baseball, football, basketball or soccer. These are designed for the coach, team manager or fan who needs accurate team and opponent records.

Ms. Davis also reported that Sugar Software has moved to Hollywood, Fla., and that she's planning a special sale of sleds, snow shovels, ice skates, sweaters, coats and boots that are not in keeping with a poolside lifestyle. These are guaranteed to work with any type computer.



Two young Sunday visitors talk about the day's events.

Rainbow publisher says Color Computer remains strong despite industry problems

RAINBOW Publisher Lonnie Falk set the record straight at the "CoCo Community Breakfast," as he remembered some events in CoCo and RAINBOW history. The CoCo Community was out in force to hear him at the sold-out event. His conclusion? "Not bad for a little game machine."

Falk is a gadget lover, as anyone who has visited Prospect knows. RAINBOW's offices are full of Falk's gadgets. The new Color Computer looked like a mighty neat gadget in late 1980 and Lonnie fell for a 4K model, the only one then available.

Unlike some of Falk's other gadgets, the CoCo worked. It worked so well that hundreds of thousands of lives have been touched through the RAINBOW, which came to life as a fourpage newsletter first written at



Falsoft President Lonnie Falk addresses the CoCo Community Breakfast.

Falk's dining room table. And that same machine proudly continues to perform chores to this day, though surrounded by many supposedly mightier computers.

Falk noted the ills now afflicting the microcomputer industry and pointed out that the CoCo world has been less affected than most other makes. The CoCo Community, which is made up of loyal and satisfied owners, plays a major role in the continued vitality of the machine. They stay with the machine and strongly recommend it to others. They are active users and continue to support a market providing a variety of software and hardware products. RAINBOWfest itself is a manifestation of the CoCo Community in action.

The future looks bright to Falk. Radio Shack continues to support the machine. A new and greater CoCo will come, he predicted, although he couldn't say exactly when. New, exciting, high-tech products continue to come to the CoCo market — and the CoCo Community thrives.

"Not bad for a little game machine."

His glasses gave him away



Dennis Kitsz (sans beard) and Green Mountain Micro exhibited an extender cable for Disk Expansion Interface that was very popular.

Green Mountain Micro's Dennis Kitsz had shaved off his beard and gotten a shorter haircut. Fortunately, he kept his distinctive glasses or no one would have recognized him. The only person whose appearance changed more at this RAINBOWfest was Bob Rosen, who was not only sans beard, but also 60 pounds lighter.

Kitsz quickly sold out of a hardware product everyone said didn't exist — an extender cable for the Disk Expansion Interface. The heavily shielded cable comes in four lengths ranging from 6 inches to 36 inches and is priced from \$20 to \$40. Another new item is a 16-channel, 12-bit analog-to-digital converter board that plugs into the ROM port or expansion interface.

Be an air traffic controller

Fast on the heels of his fine P51 Mustang Attack Flight Simulator, Tom Mix introduced Air Traffic Controller by Betasoft Systems. Frequent air travelers who have experienced extended waits in holding patterns and a variety of approaches to a particular airport will appreciate the

situations modeled by this Simulation. The air traveler probably does not fully appreciate the magnitude of an air traffic controller's problems. Both experience and a system are needed to stay on top of the variety of situations offered by this excellent program.

Print a graphics letterhead from *Telewriter-64*

Dennis Derringer and Paul Kush demonstrated Telegraphics, an impressive new Derringer Software offering. This utility allows you to use your favorite graphics editing program (Master Design, CoCo Max, Graphicom, etc.) to design a letterhead and then print it out while using Telewriter-64.

Hearing about the P.R.O. hard disk, Derringer ambled by with a copy of his *Pro-Color-File*. It worked fine and reported that there was room for 32,000- plus 100-character records. *Pro-Color-File* is not set up to handle much more than 4,000 records. Derringer plans to do some program upgrading.

Criticism of OS-9 leads Hogg to introduce QT

While we've been dreaming about the "CoCo 09," Frank Hogg has been working. He used RAINBOWfest to introduce his QT (Quad Terminal), a 68008 multi-user (up to four) computer with 128K (upgradable to 512K), four serial ports and two parallel ports. It supports two double-sided, double-density 96 tpi floppy disk drives and has an interface for a Winchester hard disk drive. The 68008 is a 32-bit CPU that runs at a scorching eight MHz!

A ton of software is bundled with the QT. You get OS-9/68K, BASIC09, DynaCalc, Stylograph, Mailmerge, Spelling Checker, a relocating macro assembler with linkage editor, screen and line editors, and an interactive debugger. Separately, the software costs about \$400 more than Frank Hogg Laboratory's basic QT price of \$1,595.

An impressive physical feature of the QT is that its sturdy metal case requires no more room than an average box of facial tissue (5½ by 11¾ inches). Of course, the terminal required by the system will add to the space requirements (not to mention the out-of-pocket requirements). One could use the CoCo as a terminal for the QT, but that seems like such a waste.



Remember when you were in school and longed for an electric pencil!

Frank Hogg has the reputation of being an outspoken member of the CoCo Community and he tells us that his criticism of OS-9 for the CoCo led him to development of the QT. If criticism has such impressive byproducts, then maybe we need more criticism.



Frank Hogg, left, and Tony DiStefano discussed products at RAINBOWfest, including Hogg's QT, a 68008 multi-user computer with 128K.



Tim Jenison of Colorware says his company is almost caught up with orders for CoCo Max.

CoCo Max ships from stock

CoCo Max was the star of the Irvine RAINBOWfest and was in short supply for two months thereafter; Colorware's booth was just as popular at Chicago.

Tim Jenison and John

Monin of Colorware reported they have finally caught up with orders and are shipping disk CoCo Max from stock. A tape version is also being shipped. Coming shortly is a font disk with 14 new typefaces.

Next RAINBOWfest is scheduled Oct. 11-13 in Princeton, N.J.

The next RAINBOWfest will be Oct. 11-13 in Princeton, N.J., and among the guest speakers will be well-known computer expert Bill Barden. Barden will be the keynoter at the CoCo Community Breakfast and will also hold a seminar on computer languages.

Among other speakers featured during the upcoming RAINBOWfest are: Steve Blyn, "The CoCo and Special Education"; Dan Downard, "Inside Your Color Computer"; Dale Puckett, "Beginners Tour of OS-9" and "Beginners Tour of BASIC09"; Dennis Kitsz, "Your Own Color Computer Hardware"; and Paul



Hoffman, "A CoCo Gallery."

Also, Puckett will be available during the show to autograph copies of his new book,

The Complete Rainbow Guide to OS-9.

The Hyatt Regency Princeton will serve as host.



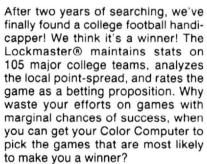
Handicapper!

Pro Football

Tired of wrestling with Sunday point spreads? Let your Color Computer do it for you! Pigskin Predictions, the best-selling NFL handicapper, is ready for 1985. Spend a few minutes typing in scores each week, and here's what it will do:

- Menu-driven selection of schedules, ratings, division races, predictions or results by team or week. Seven different reports available.
- Easy once-a-week entry of scores-no complex, meaningless stats.
- Predicts scores of all games for remainder of season each week!
- Calculates projected won-lost records for all weeks.
- Maintains home field advantage and power ratings for all teams
- 1985 schedule data file included free.
- 32/64K enhanced version features dazzling Rainbow Writer Screen display. Seeing is believing! Standard 16K version included, too.
- You'll be amazed at the power of this program. 16/32K ECB required (32K for disk). Only \$35.95 on tape or disk. 1985 Data tape or disk for previous owners, just \$13.95.

College Football



To use the program, all you need are the College Football ratings that

appear each week in USA Today. You can run individual games (including bowl games), update team stats and customize each game's rating with critical information such as coaching and quarterback changes and injuries to key players.

Using the weekly stats and our mathematical formula (which includes schedule difficulty, power ratings, offense and defense), The Lockmaster rates each game against the current point spread and tells you how sure the bet is.

The Lockmaster is easy to use and menu driven. It includes complete instructions and data file for 105 major college teams. 32K/64K Disk only. Just \$35.95.

Thoroughbred, Harness, Greyhound







Use your **Color Computer** to improve your performance at the track! These 16K programs for **Thoroughbred**, **Harness** and **Greyhound** racing rank the horses or dogs in each race quickly and easily, even if you've never handicapped before. All the information you need is readily available from the Racing form, harness or dog track program. We even provide diagrams showing you where to find each item!

Thoroughbred factors include speed, distance, past performance, weight, class, jockey's record, beaten favorite and post position. Hamess factors include speed, post position, driver's record, breaking tendencies, class, parked-out signs and beaten favorite. **Greyhound factors** include speed, past performance, maneuvering ability, favorite box, class, kennel record, beaten favorite and breaking ability.

We include complete instruction and a wagering guide that tells you which races to bet and which to avoid—one of the real secrets of good handicapping. You can buy a more expensive handicapper, but we don't think you can buy a better one! **Thoroughbred, Harness or Greyhound Handicapper,** \$34.95 each on tape or disk. Any two for \$54.95 or all three for \$74.95.

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SAKATA COLOR SC-100 \$239.95

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300 to 9600 baud. Complete with all cables

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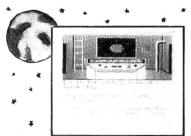
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cal keys which lead you to unbeliev-



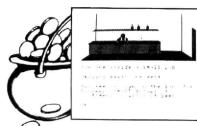
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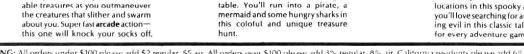
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The DragonTown Library

By Bob Albrecht and Ramon Zamora Rainbow Contributing Editors

"School Is In The Heart Of A Child" is for parents of quite young children. We want to help you work and play with your 3- to 8-year-old child and learn to use computers as a joyful family experience. We suggest ways to use the home computer as another means to encourage your child's independence, growth and control over her own life. See the pride on her face as she directs the computer to do what she selects with deliberation. See her head gears switch to "on" as she progresses step by step with your presence and caring guidance. We will explore (we hope, with your help) the following:

- Specific "teaching" techniques so the discovery can be the child's own.
- Critical evaluation of software based on extensive playtesting in family and related environments.
- Additional resources to consult: books, magazines, software publishers, networks, etc.
- Suggestions for interludes and fun times away from the computer (a must!):
 call the librarian for information; watch TV together and discuss it; work
 together as volunteers in a community project; take an "awareness" walk.
- Whatever we learn from families we work with in Menlo Park or from you, our readers. Let's pool our knowledge and share our experiences as we learn from our children.

Copyright[®] 1985 by DragonQuest, P.O. Box 7627, Menlo Park, CA 94026-7627. Portions of "School Is In The Heart Of A Child" are extracted from TRS-80 Color BASIC by Bob Albrecht.

(Well-known author Bob Albrecht has written numerous articles and books on personal computers through his association with DragonQuest. Ramon Zamora is author and co-author of several books, co-founder of Computer Town USA!, and is currently designing computer games for kids at Child Ware Corp. in Menlo Park, Calif.)



entertaining, mind-stretching or inspirational.

The best sources of general information on teaching your own children are books and a newsletter by John Holt. We recommend these: How Children Fail (Rev., 1982) \$5.95, How Children Learn (Rev., 1983) \$7.95, Teach Your Own (1981) \$8.95 and Growing without Schooling (newsletter) one year (6 issues) for \$15; single issue, \$2.50. All are available from John Holt Associates, 729 Bolyston Street, Boston, MA 02116.

Basic Skills is a book by Herbert Kohl — a wonderful book by a philosopher and doer who spends his life learning about children from children. We wish every person who is concerned about the growth and well-being of children would read this book. If your bookstore doesn't have it, order it from Bantam Books, Inc., 414 East Golf Road, Des Plaines, IL 60616. Cost is \$3.95

plus \$1.25 postage and handling.

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1-1-

rors. And just look at Elite#Calc/PBJ with an 80 column screen display...

Elite#Spel SAMPLE/BIN:1

- 2 Buspects
- List suspects on screen
- List suspects on printe
- . Apply corrections to file
- 5. Edit file in context
- 6. Learn warked words
- List words used on screenList words used on printer
- OREAC Return to 1st m

Selecti

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8 1826	ELITE, INC.			4/12/84	\$79.95	\$1163.6
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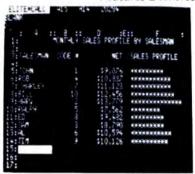
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LOOK at these features:

Very easy to use * Top screen line reserved for HELP display/Command prompts * Excellent for BOTH program editing and word processing * TWO text entry modes; insert or Exchange * Auto Key-Repeat * Smooth display scroll for easier proof reading * True Upper/Lower case display with lower case descenders * Hi-Res text "View" mode displays text exactly as it will be printed; including text Justification, Auto Line Centering, dynamic Margin changes, Top and Bottom Margins, Page Numbering, and Page Breaks * Include feature (disk only) permits including several file names within one output document; total document will have sequential page numbering if desired * Fast Disk I/O; no loading of overlay files to slow down operation * Variable Text (Mail Merge) capability for Form Letter generation included FREE!

32K Extended Basic Required for ROM routine calls . Variable TAB stops . User definable Headers and Footers . Smooth cursor movement over text; in any direction (including vertical) . Page Forward or Backward through text . Jump to beginning or end of text . Automatic text centering . Automatic text Word-Wrap if desired . True Block text Move, Delete, or Copy . Delete entire screen line . Backspace and Delete Character . Delete character above cursor . Find a string of characters . Global Replace character string . Two Hi-Res screen displays; 32 x 19 for text entry/editing, 64 x 19 for formatted text viewing . Continuous Memory display . Over 22K file size in 64K machines • Easy generation of ASCII files • Save/Load text files (in ASCII if desired) • Program remembers last File Name loaded or saved, and will write to it by default if desired . All I/O errors trapped and recoverable . Disk commands for Change Drive. Directory and Free Space . Print Format features allow user to specify Left Margin, Line Length, Line Spacing, Top and Bottom Margin, Duplicate Copies, Right-Side text Justification, Page Pause, Page Numbering, and more . Dynamically change any print Format features within text • Imbed Hex codes and printer Font changes within text.

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Paul Freiberger and Michael Swaine. From Osborne/McGraw-Hill, 2600 Tenth Street, Berkeley, CA 94710, \$9.95 (paperback). Hackers: Heroes of the Computer Revolution by Steven Levy. From Anchor Press/Doubleday, Garden City, NY. \$17.95 (hardback). Together, these books present a definitive history of the computer revolution that brought powerful, inexpensive computers to you, to me, to all of us — the people.

THE NEXT Whole Earth Catalog (second edition, 1981). We can't think of a better way to describe this catalog than the way they do it on Page 2: "THE NEXT Whole Earth Catalog is an evaluation and access device. With it, the user should know better what is worth getting and

where and how to do the getting.

An item is listed in the Catalog if it is deemed:

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4) Easily available by mail.

The listings are continually revised according to the experience and suggestions of *Catalog* users and staff."

The catalog is huge, 11 by 14½ by 1¼ inches thick, with 608 pages crammed full of the most interesting information. Get it from Whole Earth Access Company, 2990 Seventh Street, Berkeley, CA 94710. Cost is \$16 plus \$2 postage and handling (California residents add 6% sales tax).

WHOLE EARTH Review is a periodical from the same people who put out THE NEXT Whole Earth Catalog. Once there was CoEvolution Quarterly, then came The Whole Earth Software Review. Well, now the last two are merged into WHOLE EARTH Review. We recommend you get it. A year's subscription is \$18 (6 issues) from WHOLE EARTH Review, P.O. Box 27956, San Diego, CA 92128.

Parents, Kids, and Computers by Lynne Alper and Meg Holmberg — 145 pages of good information for only \$4.95. Lynne is a math and computer teacher who has been sharing computer fun and learning with her own children since 1980, when her kids were 5, 7 and 9 years old. Meg is a technical writer and editor who works closely with educators who are developing new ways for children to learn with computers. Get it at your local bookstore or from SYBEX, 2344 Sixth Street, Berkeley, CA 94710.

Sound and Color Organ

Let's turn the CoCo into a very simple sound and color organ. Your child can play up to eight notes in eight colors using the number keys '1' through '8'.

Listing 1: 100 REM**SOUND & COLOR SCH 18-1 110 CLS 199 ' 200 REM**FILL TONE ARRAY 210 FOR K=1 TO 8 220 : READ T(K) 230 NEXT K 299 ' 300 REM**TELL HOW TO PLAY 310 PRINT @480, "PRESS A KEY (1

```
TO 8)";

32Ø K$=INKEY$: IF K$="" THEN 32Ø

33Ø IF K$<"1" OR K$>"8" THEN 32Ø

399 '

4ØØ REM**PLAY NOTE & SHOW COLOR

41Ø K = ASC(K$) - 48

42Ø CLS K

43Ø SOUND T(K),1

44Ø GOTO 31Ø

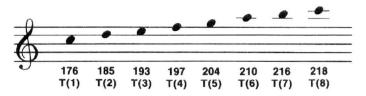
499 '

9ØØ REM**TONE NUMBERS

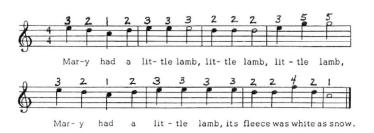
91Ø DATA 176,185,193,197

92Ø DATA 2Ø4,21Ø,216,218
```

Block 200 loads the tone numbers for the musical scale of C into subscripted variables T(1), T(2), T(3), etc.



Enter and run the program, then let your child press keys. All keys are ignored except the number keys, 1 to 8, and the BREAK key. Here are the numbers to press to play "Mary Had a Little Lamb."



Encore! How about a little ho, ho, ho? Put the numbers above the notes, then help your child play "Jingle Bells."



Make the duration of the tone longer:

430 SOUND T(K),10

Then try one of these games:

Guess My Tone Number — One person presses a number key; the other person listens and guesses which key was pressed.

Match My Tone — This one is for people with good pitch! One person hums one of the eight tones; the other person matches it by pressing the corresponding number key.

Make A Tune — Take turns pressing a number key and write down the number of the key. After both of you

press number keys a bunch of times and write down each one, you have made a tune! Take turns playing the entire tune.

Use Letters for 26 Tones

Using the letter keys A to Z, we can make the CoCo play 26 different tones. We will put the following tones in the array 'T'.

K	T(K)	Note	K	T(K)	Note
1	89	Middle C	14	180	C^{*} , D^{b}
2	99	C", Db	15	185	D
3	108	D	16	189	D*, Eb
4	117	D^{*} , E^{b}	17	193	E
5	125	E	18	197	F
6	133	F	19	200	F*, Gb
7	140	F", G ^b	20	204	G
8	147	G	21	207	G", Ab
9	153	G^{μ} , A^{b}	22	210	Α
10	159	Α	23	213	A^{μ} , B^{b}
11	165	A'', B^b	24	216	В
12	170	В	25	218	C
13	176	C	26	221	C^*

Press the letter 'A' to play Middle C. Press 'B' to play C sharp or D flat; press 'C' to play D; press 'D' to play D sharp or E flat, and so on.

Our program is quite similar to the previous one.

Listin	g 2:	
1øø	REM**SOUND & COI	LOR SCH 18-2
	DIM T(26)	
	CLS	
199		
200	REM**FILL TONE	ARRAY
	FOR K=1 TO 26	
	: READ T(K)	
230	NEXT K	
299		
300	REM**TELL HOW TO	O PLAY
31Ø	PRINT @48Ø, "PRI	ESS A KEY, A
TO :	Z";	
32Ø	K\$=INKEY\$: IF K	\$="" THEN 32Ø
33Ø	IF K\$<"A" OR K\$:	>"Z" THEN 32Ø
399		
	REM**PLAY NOTE	
	K = ASC(K\$) - 6	
	CLS K-8*INT((K-	
43Ø	SOUND T(K),1	Or whatever duration
	GOTO 31Ø	you want.
499		
	REM**TONE NUMBE	
91Ø	DATA 89,99,108,	117
92Ø	DATA 125,133,14	\emptyset , 147 $\{-1$ st octave
93Ø	DATA 153,159,16	5,17Ø)
	DATA 176,180,18	
	DATA 193,197,20	
960	DATA 207,210,21	3,216)
	DATA 218,221-	

Boggled by Line 420? Perhaps this will help. Remember, 'K' will be an integer from one to 26. Why? (See Line 410.)

K	(K-1)/8	INT((K-1)/8)	K-8*INT((K-1)/8)
1	0	0	1
2	.125	0	2
8	.875	0	8
9	1	1	1
10	1.125	1	2
16	1.875	1	8
17	2	2	1
18	2.125	2	2
24	2.875	2	8
25	3	3	1
26	3.125	3	2

The value of K-8*INT((K-1)/8 will always be an integer in the range one to eight. So, Line 420 will select one of the eight screen colors.

Would you like to change what tone is played by each letter? Easy, just rewrite the DATA statements (lines 910-970).

Guess My Number - A Storyboard

Here is a "Guess My Number" game we play with very young children using paper and pencil. First, we write down the numbers from one to nine.

1 2 3 4 5 6 7 8 9

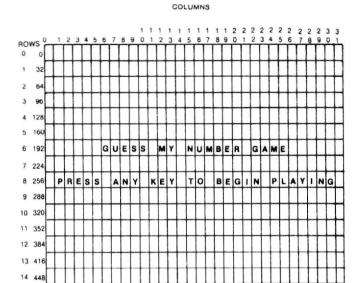
Then, we secretly pick a number. Let's pick seven. The child guesses. Suppose she guesses three. We put a "pointer" above her guess.

The pointer (>) points toward our secret number. Of course, it also means "greater than." So we say, "My number is greater than three."

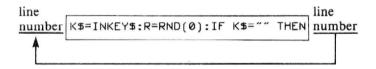
Now suppose she guesses nine. We put a "less than" pointer above '9'.

Aha! Now she will see that my secret number is caught between three and nine. It is greater than three (>3) and less than nine (<9). We continue until she guesses the secret number, and put an equals sign (=) above her correct guess.

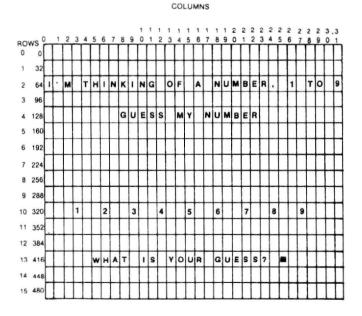
We challenge you to write a CoCo program to play this game with a child. Here is the first screen.



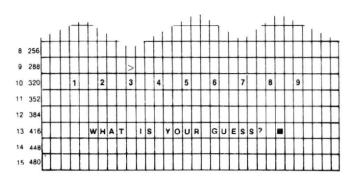
While the CoCo is waiting for someone to press a key, "spin" the RND function, like this:



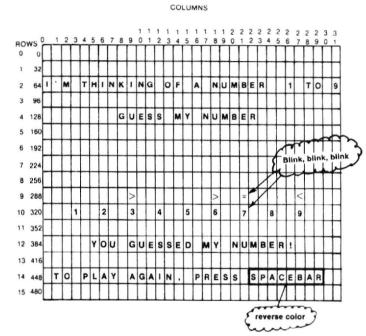
When someone presses a key, pick a secret number and show the next screen.



Suppose the secret number is seven and someone guesses three. Put the proper pointer above the '3'.



And so on. After each guess, put the proper pointer (> or <) above the guess — unless the player guesses the number. In that case, put an equals sign (=) above the correct guess, blink the correct guess and tell how to play again.



Designing a program like this is called *storyboarding*. Use our storyboard to help write the program. Next time we will show you our program.

DragonSmoke and DragonFun

DragonSmoke is our newsletter about personal and family learning, including computers, role playing games, play-by-mail games, COPY ME stuff, public domain instructional materials, software for beginners and, our own play-by-mail game, DragonFun.

Dragon Fun is a play-by-mail role playing game for beginners. It is nonviolent and features cooperation, exploration, problem-solving and story-telling. How to play is described in Dragon Smoke. Teachers: Dragon Fun can be a great class project. We will start a new game in October 1985 specifically for grades four, five and six. Your class enters two characters and guides their adventures by mail once a month throughout the school year.

DragonSmoke has become too big to stuff into self-addressed, stamped envelopes. For a sample copy, send \$1 to DragonSmoke, P.O. Box 7627, Menlo Park, CA 94026.

Now from Falsoft, The RAINBOW MAKER, comes . . .



The monthly magazine that's reader-friendly

PCM has gone through quite a number of changes lately! We've extended our coverage to include the newest Tandy computers, increased our number of pages, and because our old name sounded a bit stuffy (" — The Magazine for Professional Computing Management"), we changed it to the more reflective and friendlier "PCM — The Personal Computing Magazine for Tandy® Computer Users."

Users."
Now, we cover <u>five of the most exciting computers on the market</u>, as well as the most productive—the highly popular Model 100; a brand new portable, the Tandy 200; and Tandy's new MS-DOS

computers, the Tandy 2000, Tandy 1200 and Tandy 1000.

FREE PROGRAMS!

We learned from THE RAINBOW that readers want <u>programs to type in</u>, so, each month we bring you an assortment of them, including games, utilities, business applications and graphics.

BAR CODE, TOO!

Also, PCM is the only computer publication in the world (that we know of) that brings you programs in bar code, ready to scan into memory with the sweep of a wand!

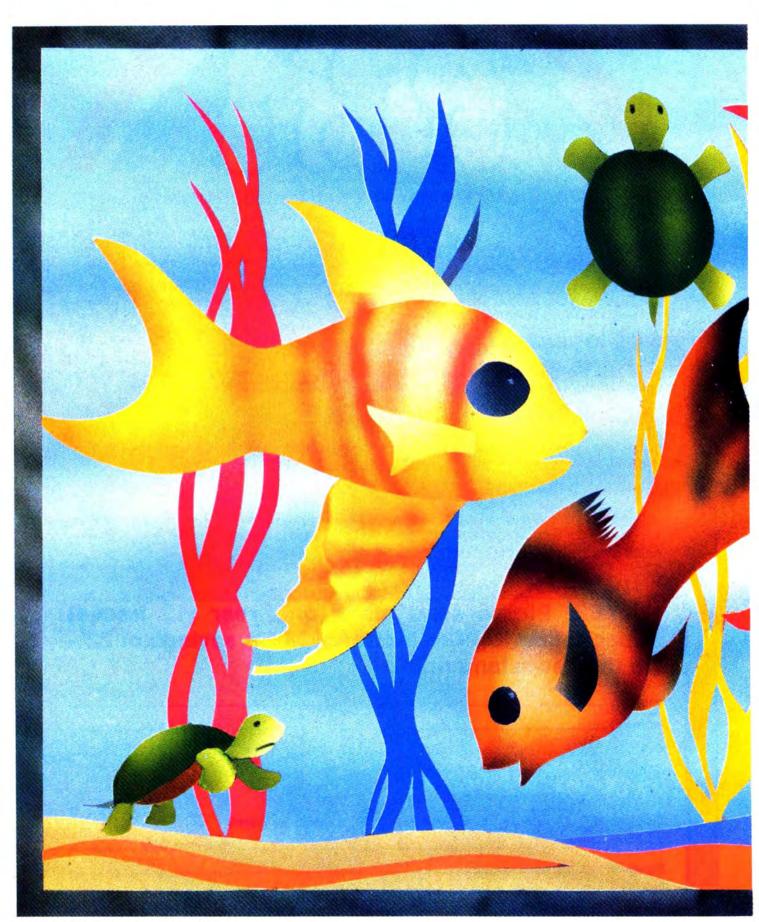
TUTORIALS GALORE

Add to this our regular tutorials on telecommunicating, hardware and machine language, as well as BASIC programming tips and product reviews, and we think you'll find we're one of the most informative and fun magazines on the market today.

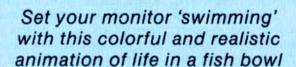
So if you're ready to add portability or step up to MS-DOS, stay with Tandy and THE RAINBOW

family through PCM.

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GUPPIE & GRAPHICS

By Jim Kent

irst high resolution machine language graphics program I ever worked was Dennis Lewandowski's shoot-'em-up space game in the November 1982 "Assembly Corner." Since then, I've been plugging away at my little CoCo and now have a program of my own to offer — Digital Aquarium.

A "digital aquarium" is no substitute for a real aquarium. It doesn't make gurgling noises (though there are bubbles) and the fish won't recognize you or flare their fins at a mirror. Still, there are no water filters to clean and, if one tires of a fish, one can simply remove it from the object list with no twinges of conscience. It is also a good example of what your CoCo can do when you ask it to. There are over 50 objects being moved at once. (I'd like to see that on a Commodore!)

(Jim Kent is a programmer at Island Graphics. He studied math at UC in Santa Cruz, Calif.)

It would really be best to get RAIN-BOW ON TAPE to enjoy this article. I've included a listing of the assembly language source. Those who don't already know can see that machine language programs tend to be very long if they intend to do much. This is because each line in assembly code does only something very simple. The basic line:

i = j + k

translates to:

lda j adda k sta i

Similarly, a BASIC line of any complexity is apt to turn into a CoCo screen-full of assembly language. Unless you are trying to learn assembly language, typing in this program will probably be impossible, for a single typing error will be enough to make everything not work. It is a pretty program, and I hope people not trying to learn assembly language will be able to enjoy it as well.

For those who have done some graphics programming, Digital Aquarium derives its remarkable speed and smoothness through the use of preshifted shapes, a DRAW-DRAW architecture, as well as from being written in fairly tightly-coded 6809 assembler. Anyone wishing to incorporate parts of this code into any of their programs, even commercial ones, should feel free to do so. I hope it encourages some games that don't involve missiles in space or jungle munch-'em-ups. My only regret with Digital Aquarium is that it doesn't use joysticks — yet.

There are two listings that accompany this article. Listing 1, F, written to be assembled using The Micro Works' Macro-80C, is the machine language code that actually does the work of animating the fish and also contains the code to produce a small aquarium. Listing 2, FISH, is a BASIC program that uses the Digital Aquarium as a USR () routine. The aquarium will run until a key is pressed, then it will return to BASIC. The PCLS () call can be followed by other BASIC graphics commands if a more elaborate, non-moving background is desired. (The October 1985 RAINBOW ON TAPE includes a longer version of the machine language program, called FLARGE, as well. To use this program, just change

Line 20 of Listing 2 to LOADM "FLARGE".

I have tried to document the assembly language as much as possible. I did not have the luxury of an 80-column screen when I developed this program, so comments appear on the line after the code they refer to rather than at the end of the same line. All parameters are passed to subroutines in registers. Subroutines are required to save registers they use unless those registers return values. The one exception to this is the software blitter (rectangle mover) routine named XORBLIT.

The only truly hairy routine in this package is CLPBLT or "clip blit." Personally, I am just happy it works

numbers to define in addition to a "type byte" at the beginning. These are naturally the horizontal and vertical offsets to be added to the character position in each frame.

The SAMPLED path is a bit more complex. The format is a type byte followed by two bytes to say how many samples there are, two bytes to say which sample we're on now, and then a list of the samples themselves. The samples are really offsets just like the straight type path. The difference is that you move each frame on to the next offset rather than always using the same one.

To go with the four types of paths there are three types of images. The first

"The upshot of this is that if you want smooth movement in the horizontal direction, you must have four copies of an image, one for each pixel that lives in a byte."

and that I no longer have to understand exactly how. This is a vital routine, however. If it weren't for CLPBLT, the fish that are half on screen would also be half on the code, and believe me, fins in place of RTSs lead quickly to seaweed soup!

Most of the machine code is set up to interpret the animation list, which is declared at the bottom of Listing 1 and Listing 2. Members of the animation list are characters, which are themselves composed of three parts: position, path and image. In each frame three functions are called for each character. First, a function associated with the path of the character is called and updates the position, then a function associated with the image is called and stuffs Register X with a "raster" (a rectangular array of pixels little square dots), and Registers A and B with the dimensions of the raster. Next a function to draw the raster at the character position is called. The fun part of this setup is that different images can have the same path and vice-versa. Furthermore, new types of paths and new types of images can easily be added.

Currently there are four types of paths: STRAIT, BOUNCE, YBOUNC and SAMPLED. The STRAIT and BOUNCE paths require only two of these is STILL. A STILL contains the type byte stating it is a STILL, followed by the dimensions of the raster containing the image, followed by the raster itself. STILL shapes will jerk if moved horizontally, but require only one-fourth the memory of the other types of shapes.

The second type of image is GLIDE. As you may know, in the color Hi-Res screen modes of your CoCo a single pixel takes up two bits. This means there are four pixels in a byte. The CoCo is a byte-oriented machine; it is not especially good at shifting around bits within a byte — it will do it, but not nearly as fast as it will throw around bytes whose bits it doesn't have to twiddle.

The upshot of this is that if you want smooth movement in the horizontal direction, you must have four copies of an image, one for each pixel that lives in a byte. This way, when you want the first pixel of an image to go to a place on the screen that is itself, say, the third pixel of a byte, you do not spend ages shifting the whole image a bit at a time before making the copy, but rather simply decide which one (in this case the third) of four pre-shifted images to put as a byte array onto the screen.

Therefore, when an image is declared to be type GLIDE you supply the first raster just as if it were a STILL, but then you reserve space for three more copies of the image — pre-shifted copies, for the machine to fill in once it gets going.

The type WIGGLE is very much like GLIDE, except instead of the CoCo doing the pre-shifting you do it yourself. The advantage of this is that without using any more memory than it would

take for smooth motion, you can have a shape that wiggles a little as it moves horizontally.

If you don't have RAINBOW ON TAPE, for a copy of the program on disk (\$6 and I'll supply disk), fresh shapes to animate or perhaps to engage in a digital fish exchange, contact me at 1001-A O'Reilly, San Francisco, CA 95129. As it stands, the program only works on machines with Extended Color Disk BASIC. To get it to run on

a cassette-based system add the line: 25 POKE 3000.8 to Listing 2. This tells it your screen is starting at \$800 instead of \$E00. It should run on 16K machines with no problem.

The Digital Aquarium was written using a Micro Works Macro-80C assembler and editor with local labels. (That's what all the A@'s are, folks.) If you own a less intelligent assembler, I'm afraid you'll have to make up new labels for them.

sting 1: F		9927 3945 EEC99996 9928 3949 26EB	B@ LDU CNEXT,U C@ BNE A@
9991 9989	XMAX EQU 128	9929 394B 35D2	PULS A,U,X,PC
ggg2 gg6g	YMAX EQU 96 *DIMENSIONS OF SCREEN		vicelenkeikeikeikeikeikeikeikeikeikeikeikeikeik
дадз дедд	ORG \$3999		* PREGLI
9994 3999 <u>9</u> E99	SCREEN FDB \$E99 *POKE IN NEW SCREEN LOCATION *HERE IF WANT TO		*INPUT: * X->IMAGE *
ggg5 3gg2	ORG \$3919		*MAKES 3 SHIFTED VERSIONS *OF RASTER AND ALL STENCILS
	*SKIP A BIT ROOM FOR	9939 394D	statatatatatatatatatatatatatatatatatata
	*MORE PARAMETERS FOR LATER *VERSIONS	9931 394D 3476	PSHS X,Y,U,A,B
	*VERSIONS	9932 394F 3276	LEAS -19,S
ggg6 3g1g	ZTART		-32
рарт заір ссреда	LDD #\$EØØ	9933 3951 8691	LDA #WIGGLE
9998 3913 FD3999	STD SCREEN	9934 3953 A7899999	STA ITYPE,X
9999 3916 CE339B	LDU #ANLIST		*PROMOTE TO PRESHIFTED TYPE
9919 3919 179912	LBSR OBINIT	gg35 3g57 FC90ggg1	עוחשן חחן
	*PRE-SHIFT SHAPES	9935 3957 EC899991	LDD IXDIM,X
gg11 3g1c 17gg88	LBSR DRAALL	9936 395B EDE4	STD ,S *SAVE DIMENSIONS
9911 3910 179900	*DRAW EVERYTHING ONE UP TOP SO		SAVE DIRECTORS
	*LOOP CAN BE UNDRAW-DRAW INSTEAD	9937 395D EC899993	LDD ILENG, X
	*OF DRAW-UNDRAW	9938 3961 ED62	STD 2,S
			*SAVE RASTER SIZE
9912 391F	LOOP		
9913 391F 179998	LBSR FRAME	9939 3963 39899995	LEAX IDATA,X
9914 3922 179223	LBSR INTRPT	22/2 22/7 220P	*POINT X TO START OF FIRST RASTER
9915 3925 27F8	BEQ LOOP *GO AROUND FOREVER OR UNTIL *USER HITS KEYBOARD	9949 3967 338B	LEAU D,X *FOINT U TO NEXT RASTER
		9941 3969 8693	LDA #3
9916 3927 CE339B	LDU #ANLIST	9942 396B A764	STA 4,S
9917 392A 17997A	LBSR DRAALL *FINAL ERASING XOR		*COUNT THROUGH THREE RASTERS
9918 392D 39	RTS	9943 396D ECE4	A@ LDD ,S
	*RETURN ALL THE WAY TO BASIC	9944 396F 1CFE	ANDCC #\$FE CLEAR CARRY
	telelelelelelelelelelelelelelelelelelel	9945 3971 179913	LBSR ASRXU
	*	9946 3974 1F31	TFR U,X
	* OBINIT	9947 3976 1CFE	ANDCC #\$FE LBSR ASRXU
	*	9948 3978 17999C 9949 397B EC62	LDD 2,S
	*INPUT:	9959 397D 33CB	LEAU D,U
	* U->CHARACTER LIST	9951 397F 6A64	DEC 4,S
	*	9952 3981 26EA	BNE A@
	*WILL PROMOTE CLIDE TYPE IMAGES *TO WIGGLE TYPES BY FILLING		*SHIFT THE IMAGES
	*IN THE PRESHIFTED IMAGES	9953 3983 326A	PREANZ LEAS 19,S
9919 392E 3452	OBINIT PSHS A,U,X	9954 3985 35F6	PULS A, B, X, Y, U, PC
yyer spen stre			
9929 3939 11839999	CMPU #9		*
	*JUST TO SET CONDITION CODE		* ASRXU
9921 3934 2913	BRA C@		*
9922 3936 AEC99994	A@ LDX CIMAGE,U.		*INPUT:
9923 393A A6899999	LDA ITYPE,X		* X->SOURCE RASTER
9924 393E 8192	CMPA #GLIDE BNE B@		* U->DESTINATION RASTER
9925 3949 2693 9926 3942 179998	LBSR PREGLI		* A = X DIMENSION OF
DATO TANT TIMES	LDSR IRLODI		* RASTER * B = Y DIMENSION
		1	n - 1 printigaton

	*SHIFTS RASTER RIGHT ONE. *CARRY BIT MUST BE SET ABOVE		**************************************
	*********		* DRAOBJ
9955 3987 3456	ASRXU PSHS X,U,A,B		*
9956 3989 327B	LEAS -5,S		*INPUT:
9957 398B EDE4	CTD C		* U->CHARACTER
9958 398D 1FA9	STD ,S TFR CC.B	9997 39EA 3436	DRAOR I ROUG A D. W. T.
9959 398F E762	STB 2.S	9998 39EC 19AEC99994	DRAOBJ PSHS A, B, Y, X
,,,	515.2,5	9999 39F1 A6A99999	LDY CIMAGE,U LDA ITYPE,Y
9969 3991 E662	ASRXU1 LDB 2,S	9199 39F5 48	LSLA
9961 3993 1F9A	TFR B,CC	9191 39F6 8E319C	LDX #DOBJT
	*PUT CARRY BIT IN RIGHT PLACE	Ø1Ø2 3ØF9 AD96	JSR [A,X]
9962 3995 E689	A@ LDB ,X+		*CALL FUNCTION TO GET NEXT
9963 3997 56	RORB	71.72	*RASTER AND STENCIL
9964 3998 E7C9	STB ,U+	рірз зрів Ессэрдар	LDD CXPOS,U
9965 399A 4A	DECA	010/ 20PP 170000	*CET CURRENT POSITION
9966 399B 26F8	BNE A@	9194 39FF 17998C	LBSR CLPBLT
9967 399D A6E4	*SHIFT ONE LINE	Ø1Ø5 31Ø2 35B6	nma . n m m
9968 399F 6A61	LDA ,S DEC 1.S	p1p3 31p2 3386	PULS A,B,X,Y,PC
9969 39A1 26EE	BNE ASRXU1		
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	Did ADIGOT		
	*SHIFT RASTER	Ø1Ø6 31Ø4 3145316B31	NOFFT FDB NEWBOU, NEWSMP, NEWSTR
		9197 319A 3134	FDB NEWYBC
9979 39A3 3265	LEAS 5.S		
9971 39A5 35D6	PULS X,U,A,B,PC	g1g8 31gc 311g3115	DOBJT FDB DSTILL, DWIGGL
			The state of the s
	*****		**************
	*		*
	* DRAALL		* DSTILL
	*		*
	*INPUT:		*INPUT Y->IMAGE
	* U->CHARACTER LIST		* U->CHARACTER
	**		*
9972 39A7	**************************************		*OUTPUT X->RASTER
9973 39A7 3449	PSHS U		*DRAW A STILL OBJECT
9974 39A9 11839999	CMPU #Ø		*DRAW A SILL OBJECT
9975 39AD 2997	BRA C@	g1g9 311g	DSTILL
9976 39AF 179938	A@ LBSR DRAOBJ	9119 3119 39A99995	LEAX IDATA, Y
9977 39B2 EEC99996	LDU CNEXT, U	g111 3114 39	RTS
9978 39B6 26F7	C@ BNE A@	,	
	Section Control Control		**************************************
ØØ79 3ØB8 35CØ	PULS U, PC		*
			* DWIGGLE
	***		*
	*		*INPUT Y->IMAGE
	* FRAME		* U->CHARACTER
	*		*OUTPUT X->RASTER
	*INPUT:		*
	★ U-> START OF CHARACTER		*DRAW AN OBJECT CAPABLE OF
	* LIST		*SMOOTH HOVEMENT, IE WITH
0000 200 2110	************		*4 PRESHIFTED SHAPES
9989 39BA 3449	FRAME PSHS U		***********
9981 39BC 11839999 9982 39C9 299D		9112 3115	DWIGGL
9983 3902 179925	BRA C@ A@ LBSR DRAOBJ	9113 3115 3496	PSHS A,B
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	*ERASE XOR IMAGE	Ø114 3117 3ØA9ØØØ5	LEAX IDATA, Y
9984 39C5 17999B	LBSR MOVOBJ		*POINT X TO START OF FIRST
9985 39C8 17991F	LBSR DRAOBJ		*RASTER
	*ACTUALLY DRAW THE THING	g115 311B E6C9gggg	IND CYPOS II
9986 39CB EEC99996	LDU CNEXT,U	9115 3118 E6G99999 9116 311F C493	LDB CXPOS,U ANDB #3
9987 39CF 26F1	C@ BNE A@	7110 JIII 0493	*FIND WHICH PIXEL IN BYTE
9988 39D1 35C9	PULS U, PC		William III DIII
		Ø117 3121 5C	INCB
	***********	9118 3122 3494	PSHS B
	* * MOVOBJ		*AND PUSH IT TO USE AS COUNTER
	* WOAORT	Sand States Assumed to U. Santa -	
	*INPUT:	9119 3124 ECA99993	LDD ILENG, Y
	* U->CHARACTER		
	*	9129 3128 2992	BRA C@
	*MOVES CHARACTER	9121 312A 398B	A@ LEAX D, X
	*FORWARD ONE 'CLICK' IN TIME	9122 312G 6AE4 9123 312E 26FA	C@ DEC ,S
	******	9123 312E 20FA	BNE A@
gg89 3gD3 3436	MOVOBJ PSHS D,X,Y	g124 313g 35g4	PULS B
9999 39D5 19AEC9999		7227 3237 3397	*CLEAR COUNTER
9991 39DA A6A99999			
9992 39DE 48	LSIA	9125 3132 3586	PULS A, B, PC
9993 39DF 8E3194	LDX #NOFFT	,	
9994 39E2 AD96	JSR [A,X] *LOOK UP FUNCTION THAT		**************************************
	*MOVES THIS TYPE OF OBJECT		*
gg95 3gE4 EDC9gggg	STD CXPOS,U		* NEWYBC
	*AND STORE FUNCTION RESULT		*NEW Y BOUNCE.
	*IN OBJECT POSITION		*
			*INPUT:
gg96 3gE8 35B6	PULS X,Y,D,PC		* U->CHARACTER

```
Y->PATH
                      *OUTPUT:
                             A=XPOS
                             B-YPOS
                      NEWYBC
Ø126 3134
9127 3134 ECC99999
                             LDD CXPOS.U
Ø128 3138 AB21
                             ADDA 1,Y
                             ADDB 2.Y
Ø129 313A EB22
                             CMPB #YMAX
@13@ 313C C16@
Ø131 313E 25Ø4
                             BLO Z@
Ø132 314Ø 6Ø22
                             NEG 2.Y
Ø133 3142 2ØF6
                             BRA A@
Ø134 3144
                      za
Ø135 3144 39
                             RTS
                             NEWBOU
                      *INPUT:
                              U->CHARACTER
                              Y->PATH
                       *OUTPUT:
                              A = X POSITION
                              B = Y POSITION
                       *UPDATES BOUNCE POSITION,
                       *AND CHANGES DIRECTION AT WALLS
Ø136 3145
                       NEWBOU
Ø137 3145 A6C9ØØØØ
                              LDA CXPOS,U
                                              XPOSITION
Ø138 3149 AB21
                              ADDA 1,Y
                                              XSPEED
Ø139 314B 817B
                              CMPA #XMAX-5
9149 314D 2594
                              BLO NBXOK
9141 314F 6921
                              NEG 1,Y
                                              BOUNCE
9142 3151 29F2
                              BRA NBX
9143 3153
                       NBXOK
                              LDB CYPOS,U
Ø144 3153 E6C9ØØØ1
                      A@
                                              YPOS
0145 3157 EB22
                              ADDB 2.Y
                                              YSPEED
@146 3159 C15B
                              CMPB #YMAX-5
Ø147 315B 25Ø4
                              BLO Z@
Ø148 315D 6Ø22
                              NEG 2.Y
Ø149 315F 2ØF2
                              BRA A@
                      Za
Ø15Ø 3161
9151 3161 39
                              RTS
                              NEWSTR
                       *INPUT:
                              U->CHARACTER
                              Y->PATH
                       *OUTPUT:
                              A - X POSITION
                              B = Y POSITION
                      *GET NEXT POSITION FOR A
                      *STRAIGHT PATH CHARACTER
Ø152 3162
                      NEWSTR
g153 3162 Ecc9gggg
                              LDD CXPOS, U
9154 3166 AB21
                              ADDA 1,Y
Ø155 3168 EB22
                              ADDB 2,Y
Ø156 316A 39
                              RTS
                       **********
                              NEWSMP
                       *INPUT:
                              U->CHARACTER
                              Y->PATH
                       *OUTPUT:
                              A = XPOS
                              B = YPOS
```



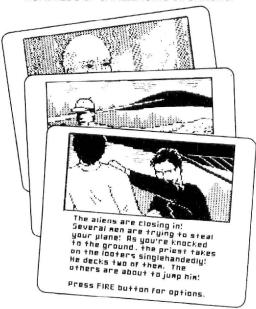
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			*UPDATES POSITION OF CHARACTER
			*BASED ON A OFFSET LIST TYPE
			*PATH

9157	316B		NEWSMP
9158	316B	3419	PSHS X
	316D		LEAX 1,Y
		EC84	LDD ,X
		C39991	ADDD #1
		19A392	CMPD 2,X
	3177		BLO A@
		CCGGGG ED84	LDD #Ø
AT02	31/6	ED84	A@ STD ,X
			*UPDATE POINTER TO NEXT SAMPLE *AND MOVING POINTER BACK TO
			*START IF PAST END
			THAT IF THAT END
g166	317E	3004	LEAX 4.X
		, ,	*MOVE OVER QUEUE POINTERS
9167	3189	58	LSLB
9168	3181	49	ROLA
			*TWO BYTES/ENTRY
9169	3182	398B	LEAX D,X
			*MOVE X TO CURRENT SAMPLE
		ECC99999	LDD CXPOS,U
	3188 318A	AB84	ADDA ,X
91/2	JIOA	FRAI	ADDB 1,X
			*ADD THIS AS AN OFFSET FROM *GURRENT LOCATION
			*CURRENT LOCATION
g173	318C	3500	PULS X.PC
7215	3200	3379	TOLIS A, TO

			*
			* CLPBLT
			*
			*INPUT:
			* D XY LOCATION OF UPPER LEFT
			* X POINTS TO RASTER
			* Y ->IMAGE

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			*		
				RASTER TO SCREE CALLS KORBLT TO	IN AND
				ALLY DRAW IT	
				CULI DOMA II	odobolości ołał
9174	318E	3476		PSHS A,B,U,X,Y	
		3271		LEAS -15.S	
9176	3192	3365		LEAU 5,S	U TO STACK AREA
9177	3194	EDE4		STD ,S	
			*SAVE	UPPER LEFT POS.O	F RASTER
	3196		CLPVER		
		E622		LDB 2,Y	
9189	3198	E7C4		Account to the second s	# OF LINES
ATRI	319A	AF46		STX 6,U	RASTER START
			*START	OFF OPTIMISTIC,	INITIAL-
			~12E I	THINGS FOR NO CLI	PPING
Ø182	319C	A661 A762 2A1A	CLPHP	LDA 1,S	
Ø183	319E	A762	01101	STA 2,S	
9184	3119	2A1A		BPL CLPDN	
			*IF BE	LOW TOP OF SCREE	N OK
Ø185	31A2	ABC4		ADDA ,U	
Ø186	31A4	192B997F		LBMI BLITZ	
Ø187	31A8	192B997F 1927997B		LBEQ BLITZ STA ,U	
9188	31AC	A704		STA ,U	LESS LINES
				BOTHER IF COMPL	ETELY
a100	21.5		*OFF T	HE TOP	
9109	STAR	49 4B22		NEGA	
Ø191	31 R1	AB22 E621		ADDA 2,Y LDB 1,Y	DACTED HARMI
9192	31B3	3D		MUL 1,1	RASTER WIDTH
		E346		ADDD 6,U	
		ED46		STD 6.U	
			*MOVE	RASTER POINTER F	ORWARD ONE
				R WIDTH FOR EACH	
			de Botte	200 0000	
			*IE "C	LIP UPWARDS" CLR 2,S	
		6F62		CLR 2,S	YCOOR SCREEN Ø
Ø196	31BA	2916		BRA CLPHOR	
7107			22 22 2		
		A661		LDA 1,S	UPPER BOUND OF RA
	31BE	AB22	STER	4DD4 2 W	
		8969		SUBA #YMAX	HEIGTH OF RASTER
		25ØE		BLO CLPHOR	
,-,-			*IF BO	TTOM OF OBJECT I	N SCREEN
			*NO PR		. John Jan
		8669		LDA #YMAX	
	31C6			SUBA 1,S	
9294	31C8	192B995B		LBMI BLITZ	
9295	31CC	19279957		LBEQ BLITZ	
				P OF OBJECT BELO	W SCREEN
anac	2100	A7C4	*NOTHI	NGTO DRAW	
2220	210%		4FICE	STA ,U STORE ACTUAL # 0	n trung
				JECT ON SCREEN	F LINES
9297	31D2		CLPHOR		
		E621			RASTER WIDTH
9299	31D4	E741		STB 1.U	TO BLAT WIDTH
			*START	OPTIMISTIC W/ N	O CLIPPING
			CLPLF		ABSOLUTE X POSN
9211				ASRB	
	31D9			ASRB	FROM PIXEL TO BYTE
		E7E4		STB ,S	X BYTE POSITION
		E763 2A18		STB 3,S	XPOSN AFTER CLIP
9215	TDE		#TE 70	BPL CLPRT	TOO FAR
			*LEFT	SITIVE THEN NOT	TOO FAR
0216	31E@	ClCg		CMPB #SCØ	HALF WRAP-AROUN
		2514		BLO CLPRT	HIGH - AROUN
			*IF TH	INK WAY POSITIVE	INSTEAD
			*OF JU	ST NEGATIVE HAND	
				CLIPPING	
		EB21		ADDB 1,Y	RASTER WIDTH
		2B3F		BMI BLITZ	
9229	JIE8	273D		BEQ BLITZ	
				EN RIGHT BYTE NE	GATIVE
g221	3154	E741	*DUN'T	EVEN BLIT	DI AM III M
9222				STB 1,U NEGB	BLAT WIDTH
		EB21			R HAS MODITO
		AE46		ADDB 1,Y LDX 6,U	RASTER START
	31F1			ABX	VARIA
		AF46		STX 6,U	ADD TO RASTER PT
				ADJUST WIDTH AND	MODULUS
				WIDTH) FOR RAST	
				RASTER POINTER F	
			*TO FI	RST BYTE ACTUALL	Y DRAWN



- Un-DISK can store BASIC and MACHINE LANGUAGE programs.
- Un-DISK is INVISIBLE. Yup! Un-DISK does not interfere with normal Color Computer Operation.
- Un-DISK appears only when you type the magic word VDOS.
- Un-DISK comes with comprehensive instructions which you may not need because:
- Un-DISK is self-prompting and easy to use!
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- Un-DISK is faster than a slow clumsy DISK DRIVE and best of all . . .
- Un-DISK is CHEAPER than a DISK DRIVE!
- Un-DISK will work even if you already own a disk but WHY BUY A DISK AT ALL?
- Un-DISK should be in the library of every serious CoCo user even if you own a disk says Frank J. Esser, independent reviewer for RAINBOW Magazine!

OK sure, disk drives ARE NICE. I own one. But if your finances are limited, the Un-DISK can give you much of the power of the mechanical drive. Even if you already own a disk the Un-DISK can work like a super fast extra disk.

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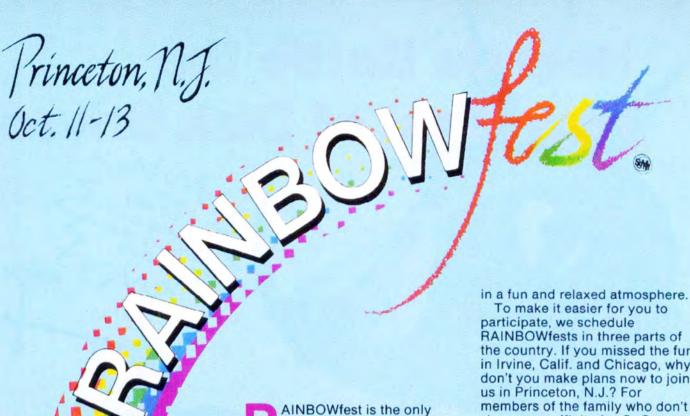
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Every RAINBOWfest features many delightful surprises because it's a great opportunity for commercial programmers to show off many new and innovative products for the very first time. You get the jump on new capabilities for your CoCo. In exhibit after exhibit, there are demonstrations, opportunities to experiment with software and hardware, and special RAINBOWfest prices.

You can set your own pace between visiting exhibits and attending valuable, free seminars on all aspects of your CoCo from improving BASIC skills to working with the sophisticated OS-9 operating system.

Many of the persons who write for THE RAINBOW - as well as those who are written about are there to meet you and answer your questions, technical and otherwise. You also will meet lots of other people, just like you, who share your interest in the Color Computer. It's a person-toperson event, as well as a tremendous learning experience,

RAINBOWfests in three parts of the country. If you missed the fun in Irvine, Calif. and Chicago, why don't you make plans now to join

share your affinity for CoCo, you'll be comfortable knowing that RAINBOWfest is located in an area with many other attractions.

The Hyatt Regency - Princeton offers special rates (\$65, single or double room) for RAINBOWfest.

The show opens Friday evening with a 7 p.m. to 10 p.m. session. It's a daytime-only show Saturday the CoCo Community Breakfast is at 8 a.m., then the exhibit hall opens promptly at 10 a.m. and runs continuously until 6 p.m. (There will be no exhibition hours or seminars Saturday evening.) On Sunday, the exhibit hall opens at 11 a.m. and closes at 4 p.m.

Tickets for RAINBOWfest may be obtained directly from THE RAINBOW. We'll also send you a special reservation form so you can get your special room rate.

Come to RAINBOWfest! Let's all celebrate the CoCo Community!

Your admission to RAINBOWfest also entitles you to visit the premiere of PCMfest! It's a brand new show focusing on Tandy's new generation of computers — the Tandy MS-DOS computers and the Tandy Portables.

PCMfest is sponsored by our sister publication, PCM, The Personal Computing Magazine for Tandy Computer Users.

Show Schedule:

Friday evening - Exhibits open from 7 p.m. to 10 p.m.

Saturday - CoCo Community Breakfast at 8 a.m. Exhibits open at 10 a.m. and close at 6 p.m.

Sunday — Exhibits open from 11 a.m. to 4 p.m.

RAINBOWfest/PCMfest

Princeton, N.J.

Dates: Oct. 11-13, 1985

Hotel: Hyatt Regency-

Princeton

Rooms: \$65 per night, single or

double

Advance Ticket Deadline:

Oct. 4, 1985

FREE T-Shirt to first five ticket orders received from each state. FREE RAINBOW poster for first 500 ticket orders recieved.

Keynote Speaker

Our guest speaker for the 8 a.m. CoCo Community Breakfast on Saturday is Bill Barden, one of the country's most widely read computer authors. In addition to hundreds of articles, Bill has written 30 books, including TRS-80 Assembly Language Programming, Color Computer Assembly Language Programming and Color Computer Graphics. Bill will discuss "Where We've Been, And Where We're Going." (Separate tickets are required.)

Free Seminars

Bill Barden

Computer Languages

As well as keynoting our CoCo Community Breakfast (Saturday at 8 a.m.), Bill will hold a seminar discussing the right language for your application. His overview will cover the most popular microcomputer languages, including BASIC, C, PASCAL and Assembly.

Dennis Kitsz

Your Own Color Computer Hardware

Dennis Kitsz, RAINBOW's newest contributing editor, is a composer, veteran hardware and software designer and president of Green Mountain Micro. His new column in our RainbowTech section debuts in this issue.

Paul Hoffman

A CoCo Gallery

Paul Hoffman is an independent designer/artist and Color Computer programmer. He is the author of Master Artist and other graphics programs from Owl-Ware.

Dale L. Puckett

Beginners Tour of OS-9 also, Beginners Tour of BASIC09

The author of *The Complete Rainbow Guide To OS-9* and *The Official BASIC09 Tour Guide* will discuss the advantages of the BASIC09 language, explain the available commands and demonstrate various functions. He also will give an overview of how to use the multitasking OS-9 operating system. Dale will be autographing copies of *The Complete Rainbow Guide To OS-9*.

Dan Downard

Q & A on Peripherals and Modifications also, Inside Your Color Computer

Dan Downard is the technical editor for THE RAINBOW and an electrical engineer. He has been involved in electronics for 25 years through ham radio (K4KWT). His interest in computers began about six years ago and he has built several 68XX systems.

Steve Blyn

The CoCo and Special Education

Steve Blyn teaches both exceptional and gifted children and has won awards for the design of programs to aid the handicapped. He is the author of the THE RAINBOW'S "Education Notes" column. He and his wife, Cheryl, own Computer Island.

Join us at future RAINBOWfests!

RAINBOWfest - Palo Alto, Calif.

Dates: Feb. 14-16, 1986

Hotel: Hyatt Hotels, Palo Alto

Rooms: \$65 per night, single or double Advance Ticket Deadline: Feb. 7, 1986 RAINBOWfest — Chicago Dates: May 23-25, 1986

Hotel: Hyatt Regency, Woodfield Rooms: \$55 per night, single or double Advance Ticket Deadline: May 16, 1986

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☐ Also send me a hotel reservation card for the Hyatt Regency-Princeton (\$65, single or double room).	Exp. Date

Make checks payable to: The RAINBOW. Mail to: RAINBOWfest, the Falsoft Building, P.O. Box 385, Prospect, KY 40059. To make reservations by phone, call: (502) 228-4492.

Advance ticket deadline: Oct. 4, 1985. Orders received less than two weeks prior to show opening will be held for you at the door. Tickets will also be available at the door at a slightly higher price. Tickets will be mailed six weeks prior to show.

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9227	31F4	6F63		CLR 3,S		
				SCREEN AT LES	FT	
9228	31F6	299C		BRA ALLCLP		
0229	31F8		CLPRT			
		8629		LDA #XMAX/4		
		AGE4		SUBA ,S		
		2829		BMI BLITZ		
,	22.0	2027		HE WAY OFF SCI	FFR	
g233	31 FF	A121	"RLL I	CMPA 1.Y	ALL.	
		2492		BHS ALLCLP		
4234	2299	2482		N SCREEN		
2235	3202	A741		STA 1.U	BYTES/LINE	
7233	JEPE	8794		31A 1,0	DITESTANE	
9236	3294		ALLCLP			
			*END O	F CLIPPING WI	HEW!	
9237	3294	A662		LDA 2.S	Y DEST.	
9238	3296	C629		LDB #32	2000000	
9239	3298	3D		MUL.		
9249	3279	F33979		ADDD SCREEN		
9241	329C	1F91		TFR D.X		
9242	329E	E663		LDB 3.S	X DEST.	
9243	3210	3A		ABX		
			*X POI	NTS TO DESTINA	ATION ON	
			*SCREE	N		
		1247				
9244	3211	AF44		STX 4.U	SCREEN START	
9245	3213	EC46		LDD 6.U	RASTER START	
3246	3215	E323		ADDD 3,Y	RASTER LENGTH	
9247	3217	ED48		STD 8.U	STENCIL START	
		8628		LDA #32		
9249	321B	AØ41		SUBA 1.U	LINE LENGTH	
9259	321D	A742		STA 2,U	SCREEN MODULO	
2202	1100					
		A621		LDA 1, Y	RASTER WIDTH	
		A941		SUBA 1,U	LINE LENGTH	
9253	3223	A743		STA 3,U	RASTER MODULO	
9254	3225	8D94		BSR XORBLT		
	200-					
9255	3227		BLITZ			

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		326F 35F6	LEAS 15,5 PULS A,B,U,X,Y,PC

			* XORBLIT
			*
			*INPUT: U-> * ,U LINES IN RASTER
			* 1,U #OF LINES IN RASTER
			* 2.U SCREEN MODULUS
			* 3,U RASTER MODULUS * 4,U SCREEN START
			* 6,U RASTER START
			*
			*XORS SOURCE WITH DEST, *TRASHES ALL REGISTER AS WELL
			*AS INPUT STRUCTURE.
			*THIS IS OK - CLPBLT EXPECTS IT
	322B		XORBLT
		AE44	LDX 4,U
		19AE46 E641	LDY 6,U
		A684	A@ LDB 1.U B@ LDA .X
9263	3234	ABAD	EORA , Y+
	3236	A789	STA .X+
		26F7	DECB BNE B@
2267	323B	A642	LDA 2.U
	323D 323F		LEAX A,X
	3241		LDA 3,U LEAY A,Y
3271	3243	6AC4	DEC .U
	3245	26E9	BNE A@
		.,	F15

			* INTERRUPT
			*
			*CHECKS FOR KEYBOARD OR PENDOWN *RETURNS EQ FOR NO KEYBOARD OR
			*NEW PENDOWN
1274	3248		TATE DT
	3248	3412	INTRPT PSHS X.A
1276	324A	4F	CLRA
		B7FF92 B6FF99	STA SFF92
	3251		LDA SFFØØ ORA #88Ø
	3253		COMA
	3254	3592	PULS X,A,PC
281		3592	ZENDCD
281	3254 3256	3592	ZENDCD *END CODE
1281 1282 1283	3254 3256 gggg	3592	ZENDCD *END CODE BOUNCE EQU 9
1281 1282 1283 1284 1285	3254 3256 9999 9991 9992		ZENDCD *END CODE BOUNCE EQU 9 SAMPLE EQU 1 STRAIT EQU 2
1281 1282 1283 1284 1285	3254 3256 9999 9991		ZENDCD *END CODE BOUNCE EQU 9 SAMPLE EQU 1 STRAIT EQU 2 YBOUNG EQU 3
1281 1282 1283 1284 1285	3254 3256 9999 9991 9992		ZENDCD *END CODE BOUNCE EQU 9 SAMPLE EQU 1 STRAIT EQU 2
7281 7282 7283 7284 7285 7286	3254 3256 9999 9991 9992 9993		ZENDCD *END CODE BOUNCE EQU 9 SAMPLE EQU 1 STRAIT EQU 2 YBOUNG EQU 3 *PATH TYPES STILL EQU 9
1281 1282 1283 1284 1285 1286	3254 3256 9999 9991 9993 9993		ZENDCD *END CODE BOUNCE EQU 9 SAMPLE EQU 1 STRAIT EQU 2 YBOUNG EQU 3 *PATH TYPES STILL EQU 9 WIGGLE EQU 1
1281 1282 1283 1284 1285 1286	3254 3256 9999 9991 9992 9993		ZENDCD *END CODE BOUNCE EQU 9 SAMPLE EQU 1 STRAIT EQU 2 YBOUNG EQU 3 *PATH TYPES STILL EQU 9
1281 1282 1283 1284 1285 1286	3254 3256 9999 9991 9993 9993		ZENDCD *END CODE BOUNCE EQU 9 SAMPLE EQU 1 STRAIT EQU 2 YBOUNG EQU 3 *PATH TYPES STILL EQU 9 WIGGLE EQU 1 GLIDE EQU 2 *IMAGE TYPES
1281 1282 1283 1284 1285 1286	3254 3256 9999 9991 9993 9993		ZENDCD *END CODE BOUNCE EQU 9 SAMPLE EQU 1 STRAIT EQU 2 YBOUNG EQU 3 *PATH TYPES STILL EQU 9 WIGGLE EQU 1 GLIDE EQU 2 *IMAGE TYPES
1281 1282 1283 1284 1285 1286	3254 3256 9999 9991 9993 9993		ZENDCD *END CODE BOUNCE EQU 9 SAMPLE EQU 1 STRAIT EQU 2 YBOUNG EQU 3 *PATH TYPES STILL EQU 9 WIGGLE EQU 1 GLIDE EQU 2 *IMAGE TYPES ** **PATH STRUCTURE
7281 7282 7283 7284 7285 7286	3254 3256 9999 9991 9993 9993		ZENDCD *END CODE BOUNCE EQU 9 SAMPLE EQU 1 STRAIT EQU 2 YBOUNG EQU 3 *PATH TYPES STILL EQU 9 WIGGLE EQU 1 GLIDE EQU 2 *IMAGE TYPES ** **PATH STRUCTURE **
7281 7282 7283 7284 7285 7286 7287 7288 7288	3254 3256 9999 9991 9992 9993 9991 9992		ZENDCD *END CODE BOUNCE EQU 9 SAMPLE EQU 1 STRAIT EQU 2 YBOUNG EQU 3 *PATH TYPES STILL EQU 9 WIGGLE EQU 1 GLIDE EQU 2 *IMAGE TYPES ** **PATH STRUCTURE **
7281 7282 7283 7284 7285 7286 7287 7288 7288	3254 3256 9999 9991 9993 9993		ZENDCD *END CODE BOUNCE EQU 9 SAMPLE EQU 1 STRAIT EQU 2 YBOUNG EQU 3 *PATH TYPES STILL EQU 9 WIGGLE EQU 1 GLIDE EQU 2 *IMAGE TYPES ** **PATH STRUCTURE **
7281 7282 7283 7284 7285 7286 7287 7288 7288	3254 3256 9999 9991 9992 9993 9991 9992		ZENDCD *END CODE BOUNCE EQU 9 SAMPLE EQU 1 STRAIT EQU 2 YBOUNG EQU 3 *PATH TYPES STILL EQU 9 WIGGLE EQU 1 GLIDE EQU 2 *IMAGE TYPES ** **PATH STRUCTURE ** PTYPE EQU 9
7281 7282 7283 7284 7285 7286 7287 7288 7289	3254 3256 9999 9991 9992 9993 9999 9992		ZENDCD *END CODE BOUNCE EQU Ø SAMPLE EQU 1 STRAIT EQU 2 YBOUNG EQU 3 *PATH TYPES STILL EQU Ø WIGGLE EQU 1 GLIDE EQU 2 *IMAGE TYPES ** ** PATH STRUCTURE ** PTYPE EQU Ø *THE REST DEPENDS ON WHAT *TYPE OF FATH
7281 7282 7283 7284 7284 7285 7286 7287 7288 7289	3256 9999 9991 9992 9999 9999 9992		ZENDCD *END CODE BOUNCE EQU 9 SAMPLE EQU 1 STRAIT EQU 2 YBOUNG EQU 3 *PATH TYPES STILL EQU 9 WIGGLE EQU 1 GLIDE EQU 2 *IMAGE TYPES ** **PATH STRUCTURE ** ** PTYPE EQU 9 *THE REST DEPENDS ON WHAT
7281 7282 7283 7284 7285 7286 7287 7288 7289 7299	3254 3256 9999 9991 9992 9993 9992 9992	gg FEG1	ZENDCD *END CODE BOUNCE EQU 9 SAMPLE EQU 1 STRAIT EQU 2 YBOUNG EQU 3 *PATH TYPES STILL EQU 9 WIGGLE EQU 1 GLIDE EQU 2 *IMAGE TYPES ** **PATH STRUCTURE ** ** PTYPE EQU 9 *THE REST DEPENDS ON WHAT *TYPE OF FATH BPATH9 FCB BOUNCE FCB -2.1
7281 7282 7283 7284 7285 7286 7287 7288 7288 7289 7297 7291 7291	3254 3256 9999 9991 9992 9999 9999 9999 9999 3256 3257	gg FEG1	ZENDCD *END CODE BOUNCE EQU 9 SAMPLE EQU 1 STRAIT EQU 2 YBOUNG EQU 3 *PATH TYPES STILL EQU 9 WIGGLE EQU 1 GLIDE EQU 2 *IMAGE TYPES ** **PATH STRUCTURE ** PTYPE EQU 9 *THE REST DEPENDS ON WHAT *TYPE OF PATH BPATH9 FCB BOUNCE
7282 7283 7284 7285 7286 7287 7288 7288 7289 7299 7291 7292 7293	3254 3256 9999 9991 9992 9993 9999 9999 3256 3257 3259	99 FE91 99 91FF	ZENDCD *END CODE BOUNCE EQU 9 SAMPLE EQU 1 STRAIT EQU 2 YBOUNG EQU 3 *PATH TYPES STILL EQU 9 WIGGLE EQU 1 GLIDE EQU 2 *IMAGE TYPES ** **PATH STRUCTURE ** ** PTYPE EQU 9 *THE REST DEPENDS ON WHAT *TYPE OF PATH BPATH9 FCB BOUNCE FCB -2,1 BPATH1 FCB BOUNCE FCB 1,-1 INITIAL DIR
7281 7282 7283 7284 7285 7286 7287 7288 7289 7297 7292 7293 7294	3254 3256 9999 9991 9992 9993 9992 9992 3256 3257 3259 325A	99 FE91 99 91FF	ZENDCD *END CODE BOUNCE EQU 9 SAMPLE EQU 1 STRAIT EQU 2 YBOUNG EQU 3 *PATH TYPES STILL EQU 9 WIGGLE EQU 1 GLIDE EQU 2 *IMAGE TYPES ** ** PATH STRUCTURE ** PTYPE EQU 9 *THE REST DEPENDS ON WHAT *TYPE OF FATH BPATH9 FCB BOUNCE FCB -2,1 BPATH1 FGB BOUNCE
7281 7282 7283 7284 7285 7286 7287 7288 7287 7288 7289 7299 7291 7292 7293 7294	3254 3256 9999 9991 9993 9993 9999 3256 3257 3259 3250	99 FE91 99 91FF	ZENDCD *END CODE BOUNCE EQU 9 SAMPLE EQU 1 STRAIT EQU 2 YBOUNG EQU 3 *PATH TYPES STILL EQU 9 WIGGLE EQU 1 GLIDE EQU 2 *IMAGE TYPES ** ** **PATH STRUCTURE ** PTYPE EQU 9 *THE REST DEPENDS ON WHAT *TYPE OF FATH BPATH9 FCB BOUNCE FCB 1,-1 BPATH2 FCB BOUNCE FCB 1,-1 BPATH2 FCB BOUNCE FCB 1,-1
1281 1282 1283 1284 1285 1286 1287 1288 1289 1299 1291 1292 1293 1294 1295 1296	3254 3256 9999 9991 9992 9993 99992 3256 3257 3259 3255 3255 3255	99 FE91 99 91FF 99 91FF	ZENDCD *END CODE BOUNCE EQU 9 SAMPLE EQU 1 STRAIT EQU 2 YBOUNG EQU 3 *PATH TYPES STILL EQU 9 WIGGLE EQU 1 GLIDE EQU 2 *IMAGE TYPES ** **PATH STRUCTURE ** ** PTYPE EQU 9 *THE REST DEPENDS ON WHAT *TYPE OF PATH BPATH9 FCB BOUNCE FCB -2.1 BPATH1 FGB BOUNCE FCB 11 BPATH2 FCB BOUNCE FCB 11 BPATH3 FCB BOUNCE
1281 1282 1283 1284 1285 1286 1287 1288 1289 1299 1299 1299 1299 1299 1299	3254 3256 9999 9991 9992 9993 99992 3256 3257 3259 3255 3255 3255	99 FE91 99 91FF 99 91FF	ZENDCD *END CODE BOUNCE EQU 9 SAMPLE EQU 1 STRAIT EQU 2 YBOUNG EQU 3 *PATH TYPES STILL EQU 9 WIGGLE EQU 1 GLIDE EQU 2 *IMAGE TYPES ** ** **PATH STRUCTURE ** PTYPE EQU 9 *THE REST DEPENDS ON WHAT *TYPE OF FATH BPATH9 FCB BOUNCE FCB 1,-1 BPATH2 FCB BOUNCE FCB 1,-1 BPATH2 FCB BOUNCE FCB 1,-1

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9393 3268 99 9394 3269 9391	BPATH6 FCB BOUNCE FCB 3,1	9369 3323 2A39 FCB XMAX/3,YMAX/2
	*	9361 3325 3256 FDB BFATH9 9362 3327 327D FDB BALL
9395 326B 99 9396 326C 9199	BPATH7 FCB BOUNCE FCB 1,9	9363 3329 332B FDB ANLIST+4*CHARLN
9397 326E 99	BPATHS FCB BOUNCE	9364 332B 4929 FCB XMAX/2.YMAX/3
9398 326F FF91	FCB -1,1	9365 332D 3259 FDB BPATH1 9366 332F 327D FDB BALL
g3g9 3271 gg	BPATH9 FCB BOUNCE	9367 3331 3333 FDB ANLIST+5*CHARLN
9319 3272 FF91	FCB -1,1	9368 3333 4939 FCB XMAX/2, YMAX/2
9311 3274 93	YBOUN1 FCB YBOUNG	9369 3335 325C FDB BPATH2 9379 3337 327D FDB BALL
9312 3275 FE91	FCB -2,1	9371 3339 333B FDB ANLIST+6*CHARLN
9313 3277 93 9314 3278 FF91	YBOUN2 FCB YBOUNG FCB -1,1	9372 333B 2A29 FCB XMAX/3,YMAX/3 9373 333D 325F FDB BPATH3
Ø315 327A Ø3		9374 333F 327D FDB BALL
9316 327B FF91	YBOUN3 FCB YBOUNG FCB -1,1	9375 3341 3343 FDB ANLIST+7*CHARLN
	***	9376 3343 4918 FCB XMAX/2, YMAX/4
	**IMAGE STRUCTURE	9377 3345 3262 FDB BPATH4 9378 3347 327D FDB BALL
9317 9999	*** ITYPE EQU 9	9379 3349 334B FDB ANLIST+8*CHARLN
g318 ggg1	*STILL, GLIDE, OR WIGGLE IXDIM EQU 1	9389 334B 2939 FGB XMAX/4,YMAX/2 9381 334D 3265 FDB BPATH5
	*IN BYTES = 4 TIMES PIXELS	Ø382 334F 327D FDB BALL
9319 9992	IYDIM EQU 2 ** OF LINES - IN PIXELS	9383 3351 3353 FDB ANLIST+9*CHARLN
9329 9993		9384 3353 2A18 FCB XMAX/3,YMAX/4 9385 3355 3268 FDB BPATH6
9321 9995	ILENG EQU 3 *ALWAYS = IXDIM*IYDIM IDATA IDATA IDATA IDATA IDATA	9385 3355 3268 FDB BPATH6 9386 3357 327D FDB BALL
	*START OF RASTER(S)	9387 3359 335B FDB ANLIST+19*CHARLN
#322 327D #2	BALL FCB GLIDE	9388 335B 2929 FCB XMAX/4,YMAX/3
9323 327E 9395	FCB 3,5 DIMENSIONS	9389 335D 326B FDB BPATH7 9399 335F 327D FDB BALL
9324 3289 999F 9325 3282 99FF99	FDB 15 LENGTH IN BYTES FCB g, SFF, g	Ø391 3361 3363 FDB ANLIST+11*CHARLN
9326 3285 93FFC9 9327 3288 93FFC9	FCB 3.SFF.SCP FCB 3.SFF.SCP	9392 3363 2918 FCB XMAX/4, YMAX/4
9328 328B 93FFC9	FCB 3, \$FF, \$CØ	9393 3365 326E FDB BPATH8 9394 3367 327D FDB BALL
9329 328E 39FF99	FCB \$9,\$FF,9	9395 3369 336B FDB ANLIST+12*CHARLN
9339 3291	RMB 15*3	9396 336B 4913 FCB XMAX/2,YMAX/5 9397 336D 3271 FDB BPATH9
9331 32BE 92 9332 32BF 9396	GUPPY FCB GLIDE FCB 3,6	9398 336F 327D FDB BALL
Ø333 32C1 ØØ12	FDB 18	9399 3371 9999 FDB 9 END OF LIST
9334 32C3 99A999	FCB \$99,\$A9,\$99	
9335 32C6 929999 9336 32C9 2A8A99	FCB \$92,\$99,\$99	
9337 32CC 856999	FCB \$2A,\$8A,\$99 FCB \$B5,\$69,\$99	
9338 32CF 2A8899 9339 32D2 999289	FCB \$2A,\$88,\$99 FCB \$99,\$92,\$89	9499 3373 ZENDDA *END DATA
9349 32D5	RMB 3*18	1/1020-PG 1000-PG-1000
77	*SPACE FOR SHIFTED IMAGES	9491 3373 END
	**	
	** CHARACTER STRUCTURE	
9341 9999 9342 9991	CXPOS EQU 9 CYPOS EQU 1	
9343 9992	CPATH EQU 2	
9344 9994 9345 9996	CIMAGE EQU 4 CNEXT EQU 6	Listing 2: FISH
S 445	*OFFSETS WITHIN CHARACTER *STRUCTURE	
g346 ggg8	CHARLN EQU 8	1Ø CLEAR 5Ø,&H3ØØØ
	*LENGTH OF CHARACTER STRUCTURE	2Ø LOADM"F
9347 339B 9348 339B 1621	ANLIST FCB 22,33	3Ø PMODE1,1
Ø349 33ØD 3274	FDB YBOUN1	4ø PCLS(1)
9359 339F 32BE 9351 3311 3313	FDB GUPPY FDB ANLIST+CHARLN	5Ø DEFUSRØ = &H3Ø1Ø
9352 3313 1A19	FCB 26,25	6Ø SCREEN 1,1
9353 3315 3277	FDB YBOUN2	7Ø A=USRØ(Ø)
9354 3317 32BE 9355 3319 331B	FDB GUPPY FDB ANLIST+2*CHARLN	8Ø SCREEN Ø,1
Ø356 331B 1716	FCB 23,22	9Ø INPUT "AGAIN"; A\$
Ø357 331D 327A	FDB YBOUN3	løø IF A\$ = "Y" THEN 6Ø

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INK-A-DINK-A-DO — Computer Friends of Portland, Ore., has introduced the first of its second generation of automatic ribbon re-inkers. The Universal Cartridge Mac Inker and the Universal Spool Mac Inker allow users to use the same inker when they change printers. The new inkers practically eliminate the cost of replacing ribbons.

Operation is simple and wholly automatic, Computer Friends says, and the carbonless ink yields a printout darker than many original ribbons. Reinked ribbons last longer than the average original ribbon and can be reinked up to 100 times, depending on their original length.

Mac Inker can ink and re-ink blank cartridges in six different colors: red. blue, green, yellow, brown and purple.

Computer Friends, 6415 SW Canyon Court, Suite 10, Portland, OR 97225.

NO DISCARD — If you've been looking for a way to encourage clients to hang onto your business cards, CP Products may have just the thing.

If you supply CP Products with your business card, they will embed it in clear plastic and bond it to the back of a wafer-thin, solar-powered, six-function (with memory) calculator. The "business card with a brain" weighs less than an ounce and does not use batteries.

CP Products, Box 431, San Pedro. CA 90733.

LABELS - Try-O-Byte has just announced a new printer utility called Try-O-Print. It is written in BASIC to permit easy customization of various labels. Try-O-Print is designed for a Color Computer and the printer of your choice.

Available on cassette or diskette, it provides routines to print multiple mailing labels, multiple cassette labels, purchase orders, invoices and a diskette directory in label format, directly from the diskette, using labels of two different sizes.

The memory required for the program is 16K and it runs in either Extended or Non-Extended BASIC. Some customizing is required.

Try-O-Byte, 1009 Alton Circle, Florence, SC 29501.

READIN', 'RITIN' AND RAM -Computer literacy is being touted as the fourth 'R' in education circles these days. This leaves many parents

unfamiliar with the possibilities of computers as learning tools, but concerned with their children's education

- wondering what to do.

The New American Library has just published a book, Compukids: A Parent's Guide to Computers and Learning, that is designed to provide parents with all the information they need to know about their child's computer education.

Written by Felicia Antonelli Holton, Compukids seeks to explain computers and how they are used: at different age and grade levels; in teaching subjects like art, music, math and grammar; in homework; and in the education of children with handicaps or learning disabilities. The book also tries to help parents assess the quality of computer education their children are receiving.

The New American Library, 1633 Broadway, New York, NY 10019.

BLACK BOX - The Black Box Corporation recently issued its midyear catalog of 160 pages. It includes more than 500 basic, unique and hardto-find data communications devices. A 12-page, full-color insert highlights 36 new products introduced in the issue.

The Black Box Catalog is considered by many people to be the catalog of the data communications field. Its publishers claim the catalog offers the largest selection of data switches available anywhere and the broadest line of problem-solving products in the industry.

The Black Box Corporation, P.O. Box 12800, Pittsburgh, PA 15241.

PERSONAL COMPUTER NET -

NewsNet, the nation's largest distributor of specialized business newsletter information, has begun carrying a new publication designed to provide users with the latest information on all aspects of personal computers hardware, software, systems and peripherals.

The Personal Computer Report, as the new publication is known, covers Tandy, IBM, Apple, AT&T, Compag, Kaypro, Microsoft, Lotus and Ashton-Tate, among other companies.

The Personal Computer Report is published monthly by Advance Microcomputers, Inc., a computer consulting, sales and publishing company in Mineola, N.Y.

NewsNet, which began in April 1982, offers full text delivery and back issue retrieval of specialized business news ranging from aerospace and investment to taxation and telecommunications.

Marcia Cheetham, NewsNet, 945 Haverford Road, Bryn Mawr, PA 19010.

ARTS BULLETIN BOARD — Artists and art organizations may be interested in a new computer bulletin board service called the Electronic Call Board, which features entertainment and theater listings for major U.S. cities. Callers can post and read free casting notices.

The new service contains one-half million bytes of online storage with five to 20 megabytes planned for the future.

Also featured on The Electronic Call Board are free software files for download, free want ads, electronic mail, an online magazine for the performing arts and general computer support and advice.

A unique feature allows callers to role play, create characters, write a scene or add to a play in progress.

The Electronic Call Board is seeking artists and organizations without computer access to list their shows, casting notices and want ads.

Bobby Ballard, Atmospheres, 1207 Eighth Ave., Brooklyn, NY 11215.



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An Adventure Into Sound Experimentation

By Bill Bernico

A demonstration on sound production with the SOUND, PLAY and EXEC commands

ne of the things a lot of programs overlook is also one of the things the CoCo is very good at . . . producing sounds. With the help of SOUND, PLAY and even EXEC commands, you can produce some very impressive sounds to help showcase your programs and make them more interesting.

The Sound statement is the simplest. A combination of Sound

191,1:50UND 220,2:50UND 10,5, for example, will produce three separate notes. A shorter, easier way is to use the PLAY command. With it, simply tell the computer to PLAY "CFG" and you will also get three separate notes.

As for EXEC, I had to experiment with different combinations to come up with a sound. For example, in lines 530 and 550, I used it to create the "helicopter" and "raspberry" sounds. EXEC 43345 by itself will produce a short "click" or "blip" sound. Enclose it in a loop, as in Line 550, and you will get the raspberry

In Line 530 you'll probably wonder why there is a CIRCLE command when there are no graphics. CIRCLE is there only to create a delay between EXECs so there won't be one continuous sound, rather a broken sound such as a helicopter taking off. You can substitute a short FDR/NEXT loop if you don't have Extended BASIC.

Running the Program

Sound Story could have simply been a menu with different sounds to pick from, but careful analysis revealed that the attention span of the program would be about 83 seconds. With that in mind, I decided to integrate these sounds into a short (and I do mean short) Adventure.

(Bill Bernico is a self-taught computerist who enjoys programming, golf, TV and music. He has played with a '60s rock band for 18 years.)

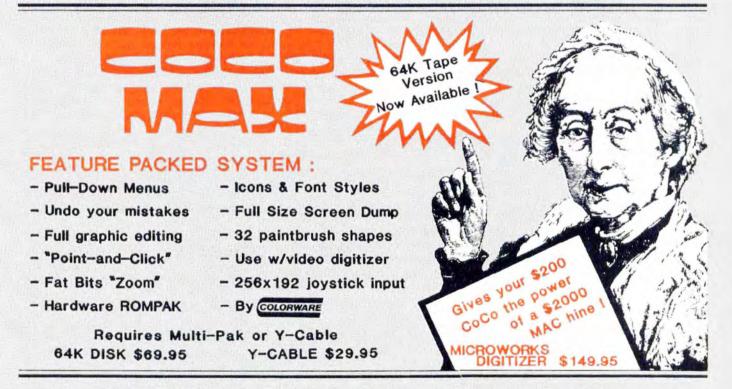
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The REM statements are highlighted in the listing so that you might examine how each sound is created. I came across a lot of these sounds by accident, by trial and error, and by experimentation. I keep a one-word reminder taped over my CoCo at all times -

Experiment!

(Any questions about Sound Story may be directed to Mr. Bernico at 708 Michigan Ave., Sheboygan, WI 53081, phone 414-459-7350. If you write, please include an SASE.)

The listing: SNDSTORY

18042 35052 46096 END 146

1Ø 'SOUND STORY

'BY BILL BERNICO 2Ø

3Ø '7Ø8 MICHIGAN AVE.

'SHEBOYGAN, WI 53Ø81

'(414) 459-735Ø

6Ø

7Ø '*** TITLE PAGE SOUND ***

8Ø CLS3:PRINT@43, "SOUND STORY";

9Ø FORX=1TO255STEP1Ø:SOUNDX,1:NE XTX

1ØØ FORX=1TO5ØØ:NEXTX

110 '*** AUTHOR'S NAME SOUND ***

12Ø PRINT@2Ø1, "BY ";:SOUND22Ø, 2:

FORX=1T015Ø:NEXT:PRINT"BILL ";:S

OUND11Ø,2:FORX=1TO15Ø:NEXT:PRINT

"BERNICO";:SOUND1Ø,2

13Ø GOSUB56Ø

14Ø CLS:PRINT"IMAGINE YOURSELF W ALKING THROUGHTHE WOODS. YOU CO HOUSE SET BACK IN ME ACROSS A THE TREES. AS YOU APPROACH, Y OU SEE THE DOOR TO THE HOUSE.

15Ø GOSUB56Ø

16Ø CLS:PRINT"ON THE DOOR YOU NO TICE THERE IS A KNOB, A DOORBELL A KNOCKER AND A SMALL PANE O F GLASS IN THECENTER. THERE DOE SN'T APPEAR TOBE ANYBODY HOME.

17Ø GOSUB56Ø

18Ø CLS:PRINT@4Ø,"WHAT WILL YOU DO?

19Ø PRINT@1ØØ,"1.) KNOCK ON THE DOOR

200 PRINT@132,"2.) RING THE DOOR

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BELL 21Ø PRINT@164,"3.) TRY THE DOORK NOB 22Ø PRINT@196,"4.) LOOK IN THE W INDOW 23Ø PRINT@228,"5.) GO AROUND THE BACK 24Ø PRINT@26Ø, "6.) ESCAPE IN HEL ICOPTER 25Ø PRINT@292,"7.) GIVE UP 26Ø PRINT@36Ø, "CHOOSE (1-7) 27Ø A\$=INKEY\$:IFA\$=""THEN27Ø 28Ø A=VAL(A\$) 29Ø IF A<1 OR A>7 THEN 26Ø 3ØØ ON A GOTO 33Ø,37Ø,41Ø,43Ø,46 Ø,53Ø,55Ø 31Ø GOTO 31Ø 32Ø '*** DOOR KNOCK SOUND *** 33Ø CLS:FORX=1TO3:PLAY"T15Ø01V31 CDCGABV25CV2ØCV15DV1ØDV5EV1E":PR INT@133, "KNOCK! KNOCK! KNOCK!" :NEXTX 34Ø PRINT@33Ø, "NOBODY HOME": GOSU B58Ø:GOTO18Ø 35Ø GOSUB 58Ø 36Ø '*** DOORBELL SOUND *** 37Ø CLS:PRINT@135,"RRRRRRRRRRRRI NG!!":PLAY"L2ØV3ØT5Ø05GBGBGBGBGB 38Ø PRINT@33Ø, "NOBODY HOME": GOSU B58Ø:GOTO18Ø 39Ø GOSUB 58Ø 400 '*** BURGULAR ALARM *** 41Ø CLS:PRINT@162,"WARNING! WARNING!":PRINT@224,"(FOR NING! GOT ABOUT THE BURGLAR ALARM) ":Q\$ ="1;2;3;4;5;6;7;8;9;10;11;12;":F ORX=1T015:PLAY"05L242V15;":PLAY Q\$:NEXTX 42Ø GOSUB58Ø:GOTO18Ø 43Ø CLS:PRINT@195,"YOU SEE A BIR D CAGE ON A STAND. THERE 'S A SMALL BIRD IN IT. H

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44Ø '*** BIRD CHIRP SOUND ***

E JUST SAW YOU."

45Ø FORX=1T05:PLAY"L255T255V2Ø05 CGCEC": FORY=1TO2ØØ: NEXTY, X: GOSUB 58Ø:GOTO18Ø 46Ø CLS:PRINT@1ØØ,"YOU'RE IN THE BACK YARD. YOU SEE THE O WNER OF THE HOUSE WITH A MACHINE GUN! BETTER R UN.... 47Ø GOSUB58Ø 48Ø '***MACHINE GUN SOUND *** 49Ø FORF=1T03 500 FORX=1T010:PLAY"L19001V28CV2 9DV2ØEV1ØF#V21G#V16GV31":NEXTX:F ORD=1TO5ØØ:NEXTD 51Ø NEXTF:GOTO18Ø 52Ø '***HELICOPTER SOUND *** 53Ø CLS:FORF=449TO42STEP-31:PRIN T@F, "UP, UP AND AWAY": FORY=1T03: CIRCLE(1Ø,1Ø),4:EXEC43345:PRINT@ F,"":NEXTY,F:GOSUB58Ø:GOTO 18Ø 54Ø '*** RASPBERRY SOUND *** 55Ø CLS:FORX=1T01ØØ:EXEC43345:NE XTX:PRINT"MY, WHAT A SHORT ADVEN TURE": END 56Ø PRINT@484,"HIT ANY KEY TO CO NTINUE";: EXEC44539: RETURN 57Ø GOTO 57Ø 58Ø FORX=1TO2ØØØ:NEXTX:RETURN (A)

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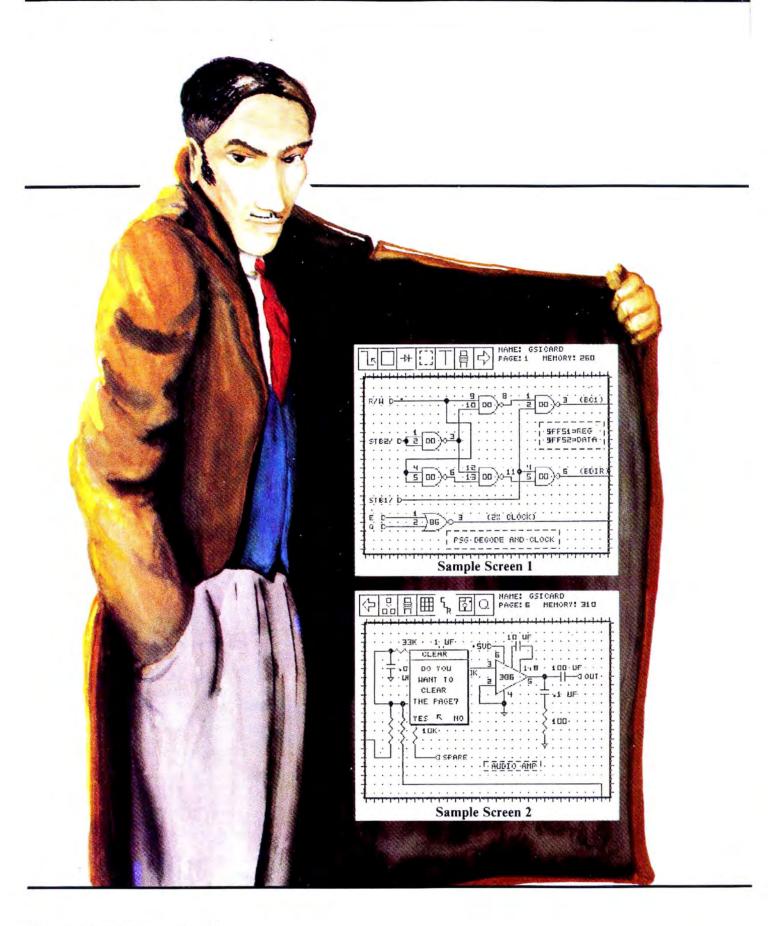
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CoCocad:

The Schematic Scoundrel

Don't let the name fool you, for this schematic drawing aid makes illustrating a breeze . . .

By Peter Kerckhoff

"mini-cad" (computer-aided design) program for the Color Computer, CoCocad aids you in drawing schematics. It requires a 32K Color Computer, one disk drive, a printer with bit mapped graphics ability and a positioning device (Radio Shack color mouse, joystick, X-pad or touch tablet). CoCocad is icon menu driven, and the keyboard is seldom used. Some functions make use of a "pop-up" menu for their options.

Instead of digging into the program and describing how I got each function to work, I have provided a highly commented listing (COCOCAD. REM); as they say, "leave the proof to the student." A word of caution: The commented listing is rather long and you'll have to PCLEAR 1 just to load it in. You'll also have to remove all of the remark statements and resave the program (use the name COCOCAD. BAS) before you try to run it. If you are keying in the program, just leave the remarks out and don't do the PCLEAR.

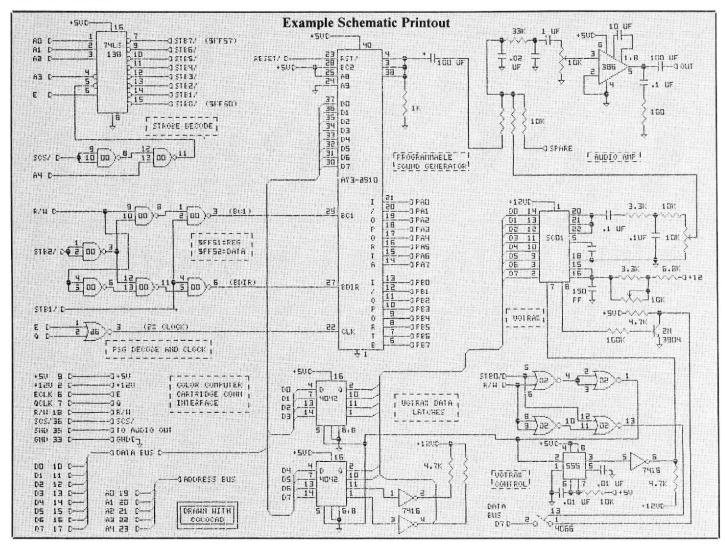
I've also included a short program listing, REMOVREM, to remove the

(Peter Kerckhoff has been working with computers since 1975 and has a bachelor's degree in electronics engineering technology. He and his wife, Renee, and daughter, Danielle, live in Silicon Valley.) remarks for you. Just remember to reload and resave the new CoCocad program as the remark remover program generates an ASCII file (program) that takes awhile to load.

Once you've got an uncommented copy of the program, load it into the computer and run it. The screen should clear and a header line followed by a question dealing with clearing memory should appear at the top of the screen. The memory clear question is so you can restart the program with a schematic in memory without losing the schematic. Since you do not have a schematic in memory, you should answer 'Y'. After a very short delay the screen will again clear and the work sheet screen will appear.

The work sheet screen is where almost all of the action takes place. At the upper left-hand corner of the screen is a series of boxes with small figures (icons) in them. I've provided a couple of screen dumps, Sample Screens 1 and 2, that show the work sheet screens. These boxes are used to call the various functions into use (more about this in a moment). In the upper right-hand portion of the display is a display of the current filename, the current page number and the memory remaining in the page.

A page is a sub-page of the whole schematic. The schematic is made up of nine sub-pages arranged in an array



three across and three down. Page zero is the upper left-hand corner of the finished schematic. Page one is just below page zero and page two just below page one. Page eight is the lower right-hand corner.

The memory for a page is used for storing each function you use to draw the schematic. If you start running out of memory space, the computer will warn you by beeping.

The main portion of the screen is taken up by the schematic work area. The sides of the work area have grid marks on them to ease the drawing of lines between pages. The work area itself is stippled with dots every eight pixels. When you are in the schematic work area, your cursor will "snap" to either the dots or to the area halfway between the dots. This makes the positioning of line end points, components and text easier.

Somewhere on the screen there should appear an arrow. The arrow should be under positional control by

your mouse (X-pad, joystick, touch pad, etc.). The arrow cursor appears when the computer wants you to select an item from the menu (or submenu, as we'll see in a minute). To select an item, position the arrow on the item and click the mouse button (press down on the button, then release).

Let's select our first menu item. Move the mouse so the arrow is in the menu box which contains the icon that looks like the letter 'Z'. Now click the mouse button. The sides of the box should disappear, letting you know the computer has accepted your command.

To activate the menu item, move the mouse down into the schematic work area. A new cursor will appear in the work area. This cursor should be shaped like a box whose corners have been flipped inwards. This is the end point (or point) cursor. The point cursor is used to identify an end point or a spot in the work area to the computer.

To draw the line, position the point

cursor to the spot in the work area where you want one end of the line to be and click the mouse button. The cursor should flicker and be replaced by a new cursor shaped like a box. This cursor identifies the first end point for your line. If you move the mouse you'll see that you still have control over the point cursor. Move the cursor to the second end point and click the mouse button. A couple of things will happen: The cursors will disappear, a line will be drawn and the memory remaining display will be updated. You still have control of the point cursor, so you can draw another line by identifying end points and so on.

To exit the line function (or any other), move the cursor up into the main menu. The point cursor will disappear and be replaced with the menu-selecting arrow cursor. Whenever you have control of the action on the screen with the mouse you can exit by going up into the main menu. This can come in handy, for example, if you've selected

the wrong first end point for a line and you'd like to start over.

OK, a quick review: To select a function from the menu, move the arrow cursor to the function and click, then move down into the schematic work area; to exit a function move the cursor back into the main menu. Easy, isn't it?

The next menu selection is the box function. We'll include in our discussion of the box function the fourth menu item (dashed box) and the fifth menu item (erase), as these functions are very similar.

Select the box function and move the mouse so the point cursor is in the schematic work area. Move the cursor to a point where you want one corner of the box to appear and click the mouse button. The cursor will vanish and, if you look closely, there will be a single pixel blinking on and off at the point where the cursor was. Now move the mouse; a box will follow the mouse's movement. When you are satisfied with the box, click the mouse button again and a box will be drawn and page memory updated. You should have the point cursor back again so you'll be all set to draw another box.

The dashed box and erase functions work much in the same way. The differences are that with the dashed box, when the box has been defined, a dashed box will be drawn. With the erase, the area in the box defined will be erased.

The third menu item, the diode, is used to select one of the preprogrammed components from the component library. Get the arrow cursor back and go up and select the component function. A pop-up menu will appear on the screen in the schematic work area. At the top of the menu is the menu title, in this case "components." In the center of the menu is the currently active component. Down at the bottom of the menu on the left are the words "PREV" and "NEXT." Placing the arrow cursor on either of these words and clicking the mouse button will change the active component displayed in the center of the menu. Holding down the mouse button while the arrow cursor is over one of these words will cycle you through the components.

At the right of the menu on the bottom is the word "USE." Clicking the mouse button while the cursor is over this word will clear the menu from the screen and give you the active component to use. The component will be under mouse control and move about in the schematic work area as you move the mouse. When you have placed the component to the desired position, click the mouse button and the component will be drawn onto the screen. If you move the mouse again, you'll notice that you still have control over the component so that another one can be drawn onto the screen. To select another component or another menu item, just move up into the main menu.

"To select a function from the menu, move the arrow cursor to the function and click... to exit a function move the cursor back into the main menu. Easy, isn't it?"

There are two more menu items, the big 'T' and the right pointing arrow. The 'T' function is used to put text on the screen. Get the arrow cursor back and select the text function. When you move the mouse back down into the work area you will notice there is a new cursor, a small horizontal line; this is the text cursor. Move the text cursor where you want the text to appear and click the mouse button. The cursor will move upwards two pixels and no longer be under mouse control. The cursor moves up so that if you are labeling a line or an end point of a line, the text will line up properly.

Enter text by typing on the keyboard. The backspace (left arrow) key has been implemented so if there is a typing error, use it to correct the error. When you finish with the text entry, press the ENTER key and the page memory will be updated with your text. The text cursor will be under mouse control again so you can move the cursor to the next spot and enter more text.

The final menu item is the right pointing arrow. This function will switch the current menu to the second menu. Try out the function by placing the arrow cursor in the box and clicking the mouse button (don't forget to move the mouse downwards to execute the function). The old menu will disappear and be replaced with a new one.

The first item in this new menu is a left pointing arrow and, you guessed it, will get you back to the original menu. The third menu item is another copy of the erase function and is identical to the one on the original menu. The remaining menu items are

The second menu item, the one with the three little squares, is the copy function. Select the function and move down into the work area. Move the point cursor to the area near the object you wish to copy and click the mouse button. Move the mouse so the box that is under mouse control surrounds the object you want to copy and click the mouse button again. The box will disappear and if you move the mouse you'll notice that a copy of the item you boxed will move. When the copy click has been positioned, the mouse button and the copy will be left on the screen and you'll get the point cursor back. Note the size of the boxed area will directly affect how fast the image will move - the larger the box the slower the move.

The fourth menu item, the one with the nine little squares, is the page switch function. When you select the function, a blinking cursor will appear as the current page number (upper right-hand portion of the display). Press a key between zero and eight to select the page. Remember, page zero is in the upper left and page eight is in the lower right of the final schematic. When a page number is selected, the current page will be cleared and the selected page displayed.

The fifth menu item, the box with the "CLR" in it, is the clear page function. Selecting the function will produce a pop-up menu asking if you really want to clear the page. Answer by positioning the cursor over your answer and clicking the mouse button.

The sixth menu item, the box with the little floppy disk, is for disk I/O and will display a pop-up menu when the function is selected. You must enter a filename before you can load or save. Once again, select the commands from the pop-up menu by positioning the cursor over the command and clicking the mouse button.

The last menu item, the large 'Q', is used to quit the program with the option of getting a printout of the schematic in memory. If you do decide to get a printout the computer will check to see if there is enough room

on the disk for the temporary storage of the sub-page image files and, if there is, will load and run the schematic printout program (Cadprint) after saving the image files.

The best and easiest way to get familiar with CoCocad is to use the program. You'll find the mouse really does work well with the program and that selecting and using the various functions follow a logical order. Before

going in and modifying the program, make sure you look it over. There are quite a few subroutines you may want to use.

For X-pad users, you will have to change the mouse scan routine to read the X-pad. You will also notice the pen status is stored in the variable 'P' and can be read directly from the X-pad (guess what positioning device I started writing the program with!).

In closing, if you use CoCocad to draw a schematic you hope to have published, please put a little note somewhere on it denoting CoCocad was used to draw the schematic — my ego will get a kick out of it. Any questions you have regarding these programs may be directed to me at 4335 Hendrix Way, San Jose, CA 95124. Please include an SASE.

```
436 .....57
43 . . . . . . . 172
                                     831 .....213
                                     874 .....89
90 . . . . . . . 134
                  460 . . . . . . 167
110 .....252
                  494 . . . . . . 143
                                     960 .....81
141 . . . . . . 42
                  530 . . . . . . 117
                                     1100 .....49
170 .....237
                  562 . . . . . . 206
                                     1280 . . . . 153
211 . . . . . 225
                  610 . . . . . . 125
                                     1580 . . . . . 254
                  641 .....4
                                     1730 . . . . . 217
241 . . . . . . 115
                                     1780 .....95
280 ......38
                  690 . . . . . . . 17
314 .....240
                  720 .....223
                                     1860 .....50
345 ......69
                  747 .....72
                                     1966 .....97
400 . . . . . . . 42
                  773 .....200
                                     END .....23
```

Listing 1: COCOCAD

This is a commented listing of the program CoCocad. To load the program you must first PCLEAR 1. To run the program you must remove all of the comment lines. Don't forget to PCLEAR 4 before running.

```
Ø
1
                    VR 2.Ø
        COCOCAD
2
    (C) 1985 BY P.KERCKHOFF
3
    4335 HENDRIX WAY SAN JOSE CA
4
    A cad SYSTEM FOR THE COLOR
5
    COMPUTER. REQUIRES 32K, DISK
6
7
    MOUSE AND A GRAPHICS PRINTER
8
9
1Ø CLEAR 5ØØ, &H64FF:CLS:INPUT"CO
COCAD VR 2.Ø
               P.KERCKHOFF
EAR PAGE MEMORY (Y/N)"; A$:GOTO12
11
12
     READ MOUSE POSITION => X,Y
     BUTTON STATUS =>P (P=3 IF
14
15
     BUTTON IS PRESSED)
2Ø X=JOYSTK(Ø)*4:Y=JOYSTK(1)*4:P
=ABS((1 AND PEEK(&HFF\emptyset\emptyset))*3-3):I
F X<3 THEN X=3 ELSE IF X>252 THE
N X = 252
3Ø IF Y<3 THEN Y=3 ELSE IF Y>188
 THEN Y=188
4Ø RETURN
```

```
41 '
42
43
     PUT A CURSOR INTO ARRAY C2
44 ' TO BE USED LATER
45
5Ø GET(Ø,Ø)-(6,6),C1,G:LINE(Ø,Ø)
-(6,6), PRESET, BF: DRAW"BM3, 3XC$(N
);":GET(Ø,Ø)-(6,6),C2,G:PUT(Ø,Ø)
-(6,6),Cl,PSET:RETURN
51
52
53
     PUT A CURSOR ON THE SCREEN
54
     OLD SCREEN DATA => C1
6Ø GET(X-3,Y-3)-(X+3,Y+3),Cl,G:P
UT(X-3,Y-3)-(X+3,Y+3),C2,AND:RET
61 '
62
63
     REMOVE CURSOR FROM THE
64
     SCREEN
65 '
70 \text{ PUT}(X-3,Y-3)-(X+3,Y+3),C1,PSE
T: RETURN
71 '
72
73 '
     DRAW A CHARACTER ROUTINE
     ENTER WITH THE CHARACTER
75 '
     IN A$
76 '
8Ø IF ASC(A$)>62 THEN 9Ø ELSE ON
ASC(A\$) - 31 GOTO 112\emptyset, 113\emptyset, 114\emptyset,
115Ø,116Ø,117Ø,118Ø,119Ø,12ØØ,12
10,1220,1230,1240,1250,1260,1270
,128ø,129ø,13øø,131ø,132ø,133ø,1
34ø,135ø,136ø,137ø,138ø,139ø,14ø
\emptyset, 141\emptyset, 142\emptyset
9\emptyset ON ASC(A$)-62 GOTO 143\emptyset,144\emptyset,
145Ø,146Ø,147Ø,148Ø,149Ø,15ØØ,15
1Ø,152Ø,153Ø,154Ø,155Ø,156Ø,157Ø
,158Ø,159Ø,16ØØ,161Ø,162Ø,163Ø,1
64Ø,165Ø,166Ø,167Ø,168Ø,169Ø,17Ø
91
92
93
     DRAW A STRING OF CHARACTERS
     ENTER WITH CHARACTER STRING
```

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Display

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PROGRAM FEATURES	NEW 11	OLD	BRAND
Upper/Lower case characters	Yes	Yes	Yes
Mixed Text and Graphics	Yes	Yes	Yes
Separate Text & Ciraphics	Yes	Yes	No
Print @ fully implemented	Yes	Yes	Yes
Print @ on all line lengths	Yes	Yes	51 only
Different line lengths	28 to 255 (9	128 to 255 (9)	51 only
Automatic Key Repeat	Yes	Yes	Yes
Adjustable Key Repeat	Yes	No	No
Auto Repeat Disable	Yes	No	No
Erase to end of line/screen	Yes	Yes	Yes
Home Cursor	Yes	Yes	Yes
Solid or Blinking Cursor	Yes	No	Yes
CLS command supported X.Y Coordinate Cursor	Buff/Biack	Buff/Black	Buff/Blace
Positioning	Yes	Yes	No
Double Size Characters Individual/Continuous	Yes	Yes	No
Highlighting	Yes	Yes	No
On Screen Underlining	Yes	Yes	No
Clear Key functional	Clear/L key	sClear key	No
16 32 & 64K Supported Green or Black Background	Yes	Yes	Yes
Color	Yes	No	No
Dual Character sets for Enhanced 64 and 85 Characters per line display	Yes	No	No
Protected Screen Lines			
(programmable) Full Control Code Keyboard for Screen control directly	1 to 23	No	No
from the keyboard Programmable Tab Character	Yes	No	No
Spacing	Yes	No	No
Full Screen Reverse Function		Yes	No
Switch to & from the Standard 16 by 32 Screen for full			
compatability	Yes	No	No
On Error Goto Function	No	No	Yes
Extended Basic Required	No	Yes	Yes
All Machine Language Program		Yes	Yes
KAM Required in addition to			
Screen RAM	2K	2K	2K
Program Price (Tape)	\$24.95	\$19.95	\$29.95





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```
154 ' PRESSED AND NOT IN MENU
95 ' IN T$, SCREEN POSITION IN
                                       155 ' AREA THEN GO TO MENU
96 ' TX AND TY. TX IS UPDATED
                                       156 ' SELECTION.
97 '
                                       157 '
100 FOR C=1 TO LEN(T$):DRAW"BM=T
X; = TY; ": A\$ = MID\$ (T\$, C, 1) : GOSUB 8
                                       16Ø GOSUB 2Ø:IF Y<2Ø OR P=3 THEN
                                        16Ø ELSE IF MN=Ø THEN ON F GOTO
Ø:TX=TX+5:NEXT C:RETURN
løl '
                                        19Ø,29Ø,44Ø,29Ø,52Ø,29Ø,18Ø ELS
1Ø2
                                       E ON F GOTO18Ø,58Ø,29Ø,68Ø,7ØØ,7
103 ' UPDATE THE SCREEN DISPLAY
                                       4Ø,82Ø
104 ' OF MEMORY SPACE REMAINING
                                       161 '
                                       162 '
1Ø5
                                       163 ' BACK FROM MENU SELECTION,
11Ø LINE(221,9)-(236,13), PRESET,
                                       164 ' REBUILD MENU, LOOP FOR
BF:TS=STRS(768-AD(PG)+A(PG)):TS=
                                       165 ' NEXT SELECTION.
RIGHT$ (T$, LEN(T$) - 1): TX=221: TY=1
3:GOSUB1ØØ:IFLEN(T$)=1THENPLAY"E
                                       166 '
E03EE02EE01EE04EE":RETURN ELSE R
                                       17Ø PLAYB$:F=F-1:LINE(F*19+1,1)-
ETURN
                                        (F*19+2\emptyset,2\emptyset), PSET, B: N=3:GOSUB5\emptyset:
111 '
                                       GOTO15Ø
112 '
                                       171 '
                                       172 '
113 ' START OF THE PROGRAM.
114
                                       173 ' SWAP MENU
12Ø DIM C$(3),A(8),AD(8),C1(1),C
                                       174
                                       18Ø LINE (\emptyset,\emptyset) - (134,2\emptyset), PRESET, BF
2(1),C3(1),L1(6),L2(6),L3(6),L4(
                                       :FORX=\emptysetTO6:LINE(X*19+1,1)-(X*19+
6), CM(15), CO(15), MD(255), MO(255)
:B$="V31L1ØØO4B":NF$="NONE"
                                       2Ø,2Ø), PSET, B: NEXT: IF MN=1 THEN
121 '
                                       MN=Ø:GOSUB 176Ø:GOTO17Ø ELSE MN=
                                       1:GOSUB 177Ø:GOTO17Ø
122
                                       181 '
123 ' DEFINE CURSOR FONTS AND
                                       182 '
124 ' SUBPAGE STORAGE ADDRESSES
                                       183 ' LINE FUNCTION, CREATE
125 ' CLEAR FIRST BYTE IN MEMORY
                                       184 ' POINT CURSOR
126 '
      IF CLEARING MEMORY
                                       185 '
127 '
                                       19Ø N=Ø:GOSUB5Ø:LX=-1
13Ø C$(\emptyset) = "BHNL2U2BR2D2R2BD2L2D2
BL2U2L2":C$(1)="BH3ND2R2BR2R2D2B
                                       191
                                       192 '
D2D2L2BL2L2U2":C$(2)="R3":C$(3)=
"NF2H2ND3R3":FOR X=\emptyset TO 8:A(X)=X
                                       193 ' WAIT FOR BUTTON NOT
                                        194 ' PRESSED
*768+&H65ØØ:IF A$="Y" THEN POKEA
                                       195 '
(X), Ø:NEXT ELSE NEXT
                                        2ØØ GOSUB2Ø:IFP=3THEN2ØØ
131 '
132 '
                                        2Ø1 '
133 ' SETUP THE SCREEN AND
                                        2Ø2
134 ' CREATE AN ARROW CURSOR
                                        203 ' MOVE POINT CURSOR, EXIT
                                        204 ' IF IN MENU AREA
135 '
                                       2Ø5 '
14Ø PG=Ø:GOSUB171Ø:MN=Ø:N=3:GOSU
                                        21Ø GOSUB2Ø:GOSUB6Ø:IFY>2ØTHEN22
B5Ø
141 '
                                       ØELSEGOSUB7Ø:IFLX=-1THEN17ØELSEP
                                       UT(LX-3,LY-3)-(LX+3,LY+3),C3,PSE
142
143 ' MOVE THE ARROW AROUND,
                                       T:GOTO17Ø
                                        211 '
144 ' WAITING FOR A VALID
                                        212
145 ' COMMAND.
                                        213 ' CONTINUE MOVING THE CURSOR
146 '
                                       214 ' UNTIL BUTTON IS PRESSED
15Ø GOSUB2Ø:GOSUB6Ø:IF P<>3 OR Y
>2Ø THEN GOSUB 7Ø:GOTO 15Ø ELSE
                                        22Ø GOSUB7Ø:IFP<>3THENX1=X:Y1=Y:
GOSUB 7\emptyset: F=INT(X/2\emptyset):IF F>6 THE
                                       GOTO21ØELSEPLAYB$:X=X1:Y=Y1
N 15Ø ELSE LINE(F*19+1,1)-(F*19+
2Ø,2Ø), PRESET, B:F=F+1:PLAYB$
                                        221 '
                                        222 '
151
                                       223 ' IF NO PREV POINT SET THEN
152
153 ' WAIT FOR BUTTON NOT
                                        224 ' SET FIRST POINT, DRAW A
```

```
225 ' CURSOR THERE AND LOOP BACK
226 ' FOR SECOND END POINT
227 '
23Ø IF LX=-1 THEN LX=X:LY=Y:GET(
LX-3, LY-3) - (LX+3, LY+3), C3, G: DRAW
"BM=LX;,=LY;XC\$(1);":GOTO2\emptyset\emptyset
231
232
233 ' REMOVE FIRST END POINT
234 ' CURSOR, EXIT IF IN MENU
235 ' AREA
236
24Ø PUT(LX-3,LY-3)-(LX+3,LY+3),C
3, PSET: IF Y<27 THEN 17Ø
241 '
242
243 ' SNAP COORDINATES
244
25\emptyset X=INT(X/4)*4:Y=INT(Y/4)*4
251
252
253 '
      DRAW THE LINE, UPDATE SUB
254 '
      PAGE MEMORY, LOOP BACK FOR
255 ' THE NEXT LINE.
256
26Ø LINE(X,Y)-(LX,LY),PSET:POKEA
D(PG),52:POKEAD(PG)+1,X:POKEAD(P
G) + 2, Y: POKEAD (PG) + 3, LX: POKEAD (PG
)+4, LY: AD(PG) = AD(PG) +5: POKEAD(PG
), Ø:GOSUB11Ø:LX=-1:GOTO2ØØ
261 '
262
263 ' ROUTINE TO SAVE THE SCREEN
264 ' DATA WHERE A BOX IS DRAWN
265 ' AND TO DRAW THE BOX.
266
27Ø GET(PX, PY) - (LX, PY), L1, G:GET(
PX, PY) - (PX, LY), L2, G: GET(LX, LY) - (
PX, LY), L3, G:GET(LX, LY) - (LX, PY), L
4,G:LINE(PX,PY)-(LX,LY),PSET,B:R
ETURN
271 '
272
273 ' ROUTINE TO UNDRAW THE BOX
    ' BY PUTTING THE ORIGIONAL
    DATA BACK
275
276
28Ø PUT(PX,PY)-(LX,PY),L1,PSET:P
UT(PX, PY) - (PX, LY), L2, PSET: PUT(LX
,LY) - (PX,LY),L3,PSET:PUT(LX,LY) -
(LX, PY), L4, PSET: RETURN
281 '
282
      BOX ROUTINE, SET UP FOR
283 '
284 ' POINT CURSOR
285 '
29Ø N=Ø:GOSUB5Ø
291 '
292
```

```
293 '
     MOVE THE CURSOR, EXIT IF
294 '
      IN MENU AREA, WAIT FOR
295 '
      BUTTON PRESSED.
296
3ØØ GOSUB2Ø:GOSUB6Ø:IF Y<2Ø THEN
 GOSUB7Ø:GOTO17Ø ELSE IF P<>3 TH
EN GOSUB7Ø:GOTO3ØØ
3Ø1 '
3Ø2
303 '
      REMOVE THE POINT CURSOR,
3Ø4 '
      SET UP BOX COORDINATES
3Ø5
31Ø GOSUB7Ø:LX=X:LY=Y:PX=LX:PY=L
Y
311
312
313 '
      WAIT FOR BUTTON NOT
314 '
      PRESSED
315
32Ø GOSUB2Ø:IFP=3THEN32Ø
321
322
323 ' DRAW A BOX, SCAN MOUSE,
      EXIT IF IN MENU AREA,
325 '
      LOOP IF BUTTON NOT PRESSED
326
      (WHEW!)
327
33Ø GOSUB27Ø:GOSUB 2Ø:IF Y<2Ø TH
```

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```
EN GOSUB 280:GOTO 170 ELSE IF P<
                                      41Ø LINE(LX,LY)-(PX,PY), PRESET, B
>3 THEN GOSUB 28Ø:PX=X:PY=Y:GOTO
                                      F:IF PX>LX THEN X=PX:PX=LX:LX=X
 33Ø
                                      420 IF PY>LY THEN Y=PY:PY=LY:LY=
331 '
332 '
                                      421 '
333 ' UPDATE MEMORY AS TO BOX
                                      422 '
334 ' COORDINATES, IF FUNCTION
                                      423 ' REBUILD THE STIPPLED
335 ' WAS A BOX THEN UPDATE MEM
                                      424 ' BACKGROUND DESTROYED IN
336 ' WITH BOX COMMAND AND LOOP
                                      425 ' THE CLEAR AND THEN LOOP
337 ' BACK FOR THE NEXT BOX.
                                      426 ' BACK FOR THE NEXT CLEAR.
338
                                      427 1
34Ø POKEAD(PG)+1,LX:POKEAD(PG)+2
                                      43Ø PX=INT(PX/8) *8:PY=INT(PY/8) *
,LY:POKEAD(PG)+3,PX:POKEAD(PG)+4
                                      8+4:FOR X=PX TO LX STEP 8:FOR Y=
,PY:POKEAD(PG)+5,Ø:IF F=2 THEN P
                                     PY TO LY STEP 8:PSET(X,Y):NEXT Y
OKE AD(PG), 53:AD(PG) = AD(PG) + 5:GO
                                      X: POKEAD(PG), 54:AD(PG)=AD(PG)+5
SUB110:GOTO290
                                      :GOSUB11Ø:GOTO29Ø
341 '
                                      431 '
342
                                      432 '
343 ' IF DASHED BOX THEN ERASE
                                     433 ' COMPONENTS FUNCTION,
344 ' THE OLD (CURSOR) BOX,
                                     434 ' BUILD POP-UP MENU, GET
345 ' UPDATE MEMORY FOR THE
                                     435 ' ARROW CURSOR
                                      436 '
346 ' DASHED BOX COMMAND.
347 '
                                      44Ø T$="COMPONENTS":GOSUB85Ø:T$=
35Ø IF F<>4 THEN 41Ø ELSE LINE(L
                                      "NEXT
                                             USE":TX=55:TY=115:GOSUB1
X,LY)-(PX,PY), PRESET, B: POKEAD (PG
                                      ØØ:T$="PREV":TX=55:TY=1Ø7:GOSUB1
),55:
                                      ØØ:N=3:GOSUB5Ø:N=1:DRAW"BM65,65"
351 '
                                      :GOSUB87Ø
352 '
                                      441 '
353 ' MAKE SURE THE COORDINATES
                                      442 '
354 ' WILL WORK IN THE FOR/NEXT
                                      443 ' SCAN THE MOUSE, IF IN THE
355 ' LOOP
                                      444 ' MENU AREA THEN EXIT ELSE
                                      445 ' LOOP UNTIL BUTTON IS
356
36Ø X=PX:Y=PY:IF X>LX THEN PX=LX
                                      446 ' PRESSED ON A VALID COMMAND
:LX=X:X=PX
                                      447 '
37Ø IF Y>LY THEN PY=LY:LY=Y:Y=PY
                                      45Ø GOSUB2Ø:GOSUB6Ø:GOSUB7Ø:IF Y
371 '
                                      <27 THEN PLAYB$:PUT(5Ø,5Ø)-(11Ø,
372 '
                                      12Ø), MO, PSET: GOTO17Ø ELSE IF Y<1
373 ' DRAW THE DASHED BOX
                                      ØØ OR Y>118 OR X<55 OR X>11Ø OR
                                      P<>3 THEN 45Ø ELSE PLAY B$
38\emptyset AD(PG)=AD(PG)+5:GOSUB11\emptyset:FOR
                                      451 '
 X1=X TO LX STEP 8:Y1=X1+4:IF Y1
                                      452 '
>LX THEN Y1=LX
                                      453 ' IF 'USE' THEN GET THE
39Ø LINE(X1,Y)-(Y1,Y),PSET:LINE(
                                      454
                                          ' COMPONENT AND BRANCH ELSE
                                      455 ' ERASE THE COMPONENT AND
X1,LY)-(Y1,LY), PSET: NEXT: FOR X1=
Y TO LY STEP8:Y1=X1+4:IF Y1>LY T
                                      456 ' EITHER DRAW THE NEXT ONE
HEN Y1=LY
                                      457 ' AND LOOP
391
                                      458
392 '
                                      46Ø IF X>8Ø THEN GET(65,65)-(65+
                                      XW, 65+YW), CM, G: PUT(50, 50) - (110, 1)
393 ' WHEN ALL DONE, LOOP BACK
394 ' FOR THE NEXT DASHED BOX
                                      2Ø), MO, PSET: GOTO48Ø ELSE DRAW"BM
                                      65,65C5":GOSUB87Ø:DRAW"BM65,65CØ
400 LINE(X,X1)-(X,Y1), PSET:LINE(
                                      ":IF Y<1Ø9 THEN 47Ø ELSE N=N+1:I
                                      F N<25 THEN GOSUB87Ø:GOTO45Ø ELS
LX,X1)-(LX,Y1),PSET:NEXT:GOTO29Ø
4Ø1 '
                                      E N=1:GOSUB87Ø:GOTO45Ø
4Ø2
                                      461 '
403 ' MUST BE THE CLEAR AREA
                                      462 '
404 ' FUNCTION SO CLEAR THE
                                      463 ' OR DRAW THE PREVIOUS
                                      464 ' ONE AND LOOP
4Ø5 ' AREA.
                                      465 '
4Ø6
```



BUT...CHECKERBOARDS ARE FOR TABLECLOTHS!

THE LOWERKIT III FROM GREEN MOUNTAIN MICRO

till cloaking your Color
Computer in a checkerboard
tablecloth? Since 1981,
thousands of Color Computer
users have uncovered their computer by
discovering the Lowerkit — the first and
best full-time lowercase and special
symbols generation system for your
Color Computer.

Why a Lowerkit? Because uppercase-only display is a relic of the user-unfriendly past. And because you can't really read a checkerboard excuse for lowercase display. Sure, software lowercase comes with a handful of commercial programs. But software lowercase gobbles up over 6,000 bytes of your precious memory. Even if you have 64K, you'll give up 10 % of it for a simple lowercase display. And software lowercase vanishes when you change programs or turn off your computer.

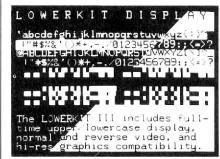
Take 15 minutes. Put the Lowerkit in. A Lowerkit is simple, reliable — and it's always there. You flip on your machine, and Lowerkit's bold lettering greets you.

No tapes, disks or cartridges to load first. No compatibility problems; when you don't want it, you switch it off.

And now, the new Lowerkit III includes a reverse screen switch as well. Big, bright green letters on a black background.



Original Color Computer Display



LOWERKIT III Display (reverse video, too)

Four years ago, the Lowerkit made history and set the standard in Color Computer lowercase. For example, game and education programs from Sugar Software have Lowerkit display options. Spectrosystems' ADOS supports the Lowerkit; so does Cer-Comp's TextPro. Cartridge Scripsit looks beautiful with a Lowerkit. Spectrum Projects, Cheshire Cat and many others have developed beautiful alternate character sets which you can download from Micronet, burn into an EPROM, and snap into your Lowerkit.

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Hours: 9am-5pm, Monday-Friday COD/VISA/MASTERCARD TRS-80 is a trademark of Tandy Corporation 47Ø N=N-1:IF N>Ø THEN GOSUB87Ø:G OTO45Ø ELSE N=24:GOSUB87Ø:GOTO45 471 472 ' SCAN THE MOUSE 473 474 48Ø GOSUB2Ø 481 482 483 ' MOVE THE COMPONENT UNTIL BUTTON IS PRESSED OR 484 485 ' IN MENU AREA 486 49Ø GET(X,Y)-(X+XW,Y+YW),CO,G:PU T(X,Y)-(X+XW,Y+YW), CM, AND: LX=X:L Y=Y:GOSUB2Ø:IF P<>3 AND Y>26 THE N PUT(LX,LY)-(LX+XW,LY+YW),CO,PS ET: GOTO 49Ø 491 ' 492 IF IN MENU AREA THEN ERASE 493 ' THE COMPONENT AND EXIT 494 495 500 IF Y<27 THEN PUT(LX,LY)-(LX+ XW, LY+YW), CO, PSET: GOTO 17Ø 5Ø1 ' 5Ø2

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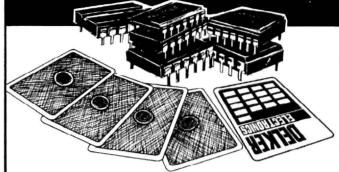


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```
LEAVE THE COMPONENT ON
5Ø3 '
5Ø4
      THE SCREEN AND UPDATE
     MEMORY. THEN LOOP BACK
5Ø5
   ' TO PUT THE NEXT COMPONENT
5Ø6
      ON THE SCREEN.
5Ø7
5Ø8
51Ø PLAYB$:POKEAD(PG),N:POKEAD(P
G)+1, LX: POKEAD (PG) +2, LY: AD (PG) =A
D(PG)+3:POKEAD(PG),Ø:GOSUB11Ø:GO
TO480
511
512
      TEXT FUNCTION
513
514
      GO CREATE THE TEXT CURSOR
515
52Ø N=2:GOSUB5Ø
521
522
      MOVE THE CURSOR, WAITING
523
      FOR EITHER BUTTON CLICK
524
525
      OR IN MENU AREA
526
53Ø GOSUB2Ø:GOSUB6Ø:GOSUB7Ø:IF P
<>3 AND Y>26 THEN 53Ø ELSE Y=Y-2
531
532
      IF IN MENU AREA THEN EXIT
533
      ELSE UPDATE MEMORY FOR
536
      THE TEXT FUNCTION
537
54Ø IFY<27 THEN 17Ø ELSE PLAYB$:
POKEAD(PG),51:POKEAD(PG)+1,X:POK
EAD(PG)+2, Y: AD(PG)=AD(PG)+3: GOSU
Bllø:Xl=AD(PG)
541 '
542
543
    ' GO SCAN THE KEYBOARD, IF
544
    ' ENTER IS PRESSED THEN EXIT
545
55Ø GOSUB6Ø:A$=INKEY$:GOSUB7Ø:IF
 A$="" THEN 55Ø ELSE PLAY B$:IF
A$=CHR$(13) THEN POKE AD(PG),255
:AD(PG) =AD(PG) +1:POKEAD(PG),Ø:GO
SUB11Ø:GOTO52Ø
551
552
      IF BACK SPACE IS PRESSED
      THEN DO A BACK SPACE
554
555
56Ø IF A$=CHR$(8) THEN IF AD(PG)
>X1 THEN AD(PG)=AD(PG)-1:X=X-5:L
INE(X,Y)-(X+5,Y-6), PRESET, BF: GOT
055Ø ELSE GOT055Ø
561
562
      ELSE DRAW THE CHARACTER
563
564
      AND LOOP FOR MORE
565
57Ø POKEAD(PG), ASC(A$):AD(PG)=AD
```

```
(PG)+1:DRAW"BM=X;,=Y;":GOSUB8Ø:X
=X+5:GOSUB11Ø:GOTO55Ø
571 '
572
573 ' COPY ROUTINE, GO GET
574 ' A CURSOR
575
58Ø N=Ø:GOSUB5Ø
581
582
583 ' MOVE CURSOR UNTIL IN MENU
584 ' AREA OR BUTTON CLICK
585 '
59Ø GOSUB2Ø:GOSUB6Ø:IF P<>3 AND
Y>26 THENGOSUB7Ø:GOTO59ØELSEGOSU
B7Ø:IF Y<27 THEN17Ø
591 '
592
593 ' SAVE CURSOR COORDINATES
594 '
600 PLAYB$:LX=X:LY=Y:PX=LX:PY=LY
6Øl
6Ø2
6Ø3
   ' WAIT FOR BUTTON NOT DOWN
6Ø4
61Ø GOSUB2Ø:IFP=3THEN61Ø
611 '
612 '
613 ' DRAW A BOX, SCAN MOUSE IF
      IN MENU THEN ERASE BOX AND
615 '
     EXIT, IF BUTTON NOT CLICK
616 '
      THEN ERASE BOX AND LOOP
617
62Ø GOSUB27Ø:GOSUB2Ø:IFY<26THENG
OSUB28Ø:GOTO17ØELSEIFP<>3THENGOS
UB28Ø:PX=X:PY=Y:GOTO62Ø
621
622 '
623 '
      ERASE BOX, GET BOXED AREA
624 ' UPDATE MEMORY
625 '
63Ø GOSUB28Ø:PLAYB$:XW=ABS(PX-LX
):YW=ABS(PY-LY):IF (XW*YW)>1ØØØØ
THEN 58Ø ELSE GET(LX,LY)-(PX,PY
), MD, G: POKEAD (PG) +1, PX: POKEAD (PG
)+2,PY:POKEAD(PG)+3,LX:POKEAD(PG
)+4,LY
631 '
632 '
633 ' SCAN MOUSE, PUT IMAGE ONTO
      THE SCREEN, LOOP UNTILL
635 '
      IN MENU OR BUTTON CLICK
636
64Ø GOSUB2Ø:GET(X,Y)-(X+XW,Y+YW)
,MO,G:PUT(X,Y)-(X+XW,Y+YW),MD,AN
D:PUT(X,Y)-(X+XW,Y+YW),MO,PSET:I
FY<27THEN17ØELSEIFP<>3THENX1=X:Y
1=Y:GOTO64ØELSEX=X1:Y=Y1:PUT(X,Y
) - (X+XW, Y+YW), MD, AND
```

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641 '	693 ' CLEAR (THE PAGE) FUNCTION
642 '	694 ' DISPLAY CLEAR MENU
643 ' UPDATE MEMORY, LOOP	695 '
644	7ØØ T\$=" CLEAR":GOSUB85Ø:T\$="YE
65Ø POKEAD(PG),56:POKEAD(PG)+5,X	S NO":TX=55:TY=115:GOSUB1ØØ:
: $POKEAD(PG)+6$, Y: $AD(PG)=AD(PG)+7$:	N=3:GOSUB5Ø:TX=63:TY=7Ø:T\$="DO Y
POKEAD (PG), Ø:GOSUBILØ:GOTO58Ø	OU":GOSUB1ØØ:TX=6Ø:TY=8Ø:T\$="WAN
671 '	T TO":GOSUB1ØØ:TX=63:TY=9Ø:T\$="C
672 '	LEAR":GOSUB1ØØ:TX=55:TY=1ØØ:T\$="
673 ' PAGE (SWITCH) FUNCTION	THE PAGE?":GOSUBLØØ
674 ' PUT CURSOR AT PAGE DISPLAY	7Ø1 '
675 ' WAIT FOR VALID PAGE #	702 '
676 ' (KEY) PRESSED	7Ø3 ' SCAN MOUSE, MOVE ARROW
677 '	704 ' CURSOR, WAIT FOR VALID
68Ø LINE(166,13)-(171,8),PSET,BF	7Ø5 ' OPTION CLICK OR IN MAIN
:A\$=INKEY\$:LINE(166,13)-(171,8),	706 ' MENU AREA
PRESET, BF: IF A\$<"Ø" OR A\$>"8" TH	707 '
EN 68Ø	,
681 '	71ø GOSUB2ø:GOSUB6ø:GOSUB7ø:IFY< 27 THEN PLAYB\$:PUT(5ø,5ø)-(11ø,1
682 '	27 THEN PLAIDS: PUT(50,50) = (110,1
683 ' DISPLAY NEW PAGE	2Ø), MO, PSET: GOTO17Ø ELSE IF Y<1Ø
684 '	Ø OR Y>12Ø OR X<55 OR X>11Ø OR P
69Ø PG=VAL(A\$):DRAW"BM166,13":GO	<>3 THEN 71Ø ELSE PLAY B\$
	711 '
SUB8Ø:LINE(8,28)-(247,183), PRESE	712 '
T,BF:GOSUB179Ø:FORX=8TO248STEP8:	713 ' NOPE, DIDN'T REALLY WANT
FORY=28TO184STEP8: PSET(X,Y): NEXT	714 ' TO CLEAR THE PAGE
Y,X:GOSUB11Ø:GOTO17Ø	715 '
691 '	72Ø IF X>8Ø THEN PUT(5Ø,5Ø)-(11Ø
692 '	,12Ø),MO,PSET:GOTO17Ø

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```
721 '
722 '
723 ' CLEAR THE PAGE BY SETTING
724 '
      FIRST MEMORY BYTE TO Ø
725 ' THEN CLEAR THE SCREEN
726 ' AND LOOP BACK TO MAIN
727 '
73\emptyset POKEA(PG),\emptyset:AD(PG)=A(PG):GOS
UB11Ø:LINE(8,28)-(247,183), PRESE
T,BF:FORX=8T0248STEP8:FORY=28T01
84STEP8: PSET(X,Y): NEXTY, X:GOTO17
731
732 '
733 ' DISK FUNCTION(S)
734
      DISPLAY DISK MENU
735 '
74Ø T$="
            DISK":GOSUB85Ø:T$="NA
ME'':TX=7\emptyset:TY=7\emptyset:GOSUB1\emptyset\emptyset:T$="LOA
D":TX=7Ø:TY=8Ø:GOSUBlØØ:T$="SAVE
":TX=7Ø:TY=9Ø:GOSUB1ØØ:N=3:GOSUB
741 '
742 '
743 ' SCAN MOUSE, EXIT IF IN
744 ' MAIN MENU AREA, LOOP IF
745 ' BUTTON NOT DOWN OR NOT
746 ' IN DISK MENU
747 '
75Ø GOSUB2Ø:GOSUB6Ø:GOSUB7Ø:IF Y
<27 THEN PLAYB$: PUT(5Ø,5Ø)-(11Ø,
12Ø), MO, PSET: GOTO17Ø ELSE IF Y<6
Ø OR Y>9Ø OR X<7Ø OR X>9Ø OR P<>
3 THEN 75Ø ELSE PLAY B$
751 '
752 '
753 ' IF NAME OPTION THEN GET
754 ' A FILE NAME
755
76Ø IF Y>7Ø THEN 77Ø ELSE CLS:LI
NEINPUT"FILE NAME =>";NF$:SCREEN
1,1:LINE(17\emptyset,5)-(21\emptyset,\emptyset),PRESET,B
F:TY=5:TX=17\emptyset:T\$=NF\$:GOSUB1\emptyset\emptyset:GO
T075Ø
761 '
762
763 ' IF LOAD OR SAVE THEN FIRST
764 ' CHECK FOR A FILE NAME
765 ' IF LOADING THEN LOAD
766 ' THE PAGES (MEMORY) AND
767 ' EXIT
768 '
77Ø IF NF$="" OR NF$="NONE" THEN
 75Ø ELSE IF Y>8Ø THEN 78Ø ELSE
TX=6Ø:TY=11Ø:T$="LOADING":GOSUB1
ØØ:LOADM NF$:A$="Ø":GOTO 69Ø
771 '
772 '
773 ' SAVE THE PAGES (MEMORY)
```

774 78Ø IF Y>9Ø THEN 75Ø ELSE TX=6Ø: TY=110:T\$="SAVING":GOSUB100:SAVE M NF\$,&H65ØØ,&H7FFF,&H65ØØ:LINE(6Ø,11Ø)-(9Ø,1Ø5), PRESET, BF:GOTO7 5ø 811 ' 812 ' 813 ' QUIT FUNCTION 814 ' DISPLAY QUIT MENU 815 82Ø T\$=" QUIT":GOSUB850:TX=60: TY=7Ø:T\$="SAVE TO":GOSUB1ØØ:TX=7 Ø:TY=8Ø:T\$="DISK":GOSUBlØØ:T\$="Y NO":TX=55:TY=115:GOSUB100 :N=3:GOSUB5Ø 821 ' 822 823 ' THE OL' LOOP UNLESS THE 824 ' OPTION IS CALLED LINE 825 ' 83Ø GOSUB2Ø:GOSUB6Ø:GOSUB7Ø:IF Y <27 THEN PLAYB\$:PUT(5ø,5ø)-(11ø, 12Ø), MO, PSET: GOTO17Ø ELSE IF Y<1 ØØ OR Y>12Ø OR X<5Ø OR X>11Ø OR P<>3 THEN 83Ø ELSE PLAY B\$ 831 ' 832 ' 833 ' BRANCH IF DISK SAVE NEEDED



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834 ' ELSE CHECK TO SEE IF A 835 ' PRINTOUT IS WANTED ELSE 836 ' EXIT (STOP) THE PROGRAM 837 84Ø IF X<8Ø THEN PUT(5Ø,5Ø)-(11Ø ,12Ø),MO,PSET:GOTO74Ø ELSE CLS:I NPUT"DO YOU WANT A PRINTOUT (Y/N)";A\$:IF A\$="Y" THEN 197Ø ELSE P RINT "OK...BYE.":STOP 841 ' 842 843 ' DISPLAY A (POP-UP) MENU 85Ø GET $(5\emptyset, 5\emptyset)$ - $(11\emptyset, 12\emptyset)$, MO, G:LI $NE(5\emptyset, 5\emptyset) - (11\emptyset, 12\emptyset)$, PRESET, BF:LI NE(51,51)-(108,118), PSET, B:LINE(52,119)-(1Ø9,119), PSET:LINE-(1Ø9 ,52), PSET: LINE (51,60) - (108,60), P SET:TX=54:TY=57:GOSUB1ØØ:RETURN 861 ' 862 863 ' DRAW A COMPONENT (N) 864 1 87Ø ON N GOTO 88Ø,89Ø,9ØØ,91Ø,92 Ø,93Ø,94Ø,95Ø,96Ø,97Ø,98Ø,99Ø,1Ø ØØ, 1Ø1Ø, 1Ø2Ø, 1Ø3Ø, 1Ø4Ø, 1Ø5Ø, 1Ø6Ø ,1Ø7Ø,1Ø8Ø,1Ø9Ø,11ØØ,111Ø 871

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872 ' 873 ' DRAW (STRINGS) FOR THE 874 ' COMPONENTS (IDENTIFIED 875 ' AT THE END OF THE LINES) 88Ø DRAW"BD15U15R13FRF4DFD2GDG4L GL13":XW=23:YW=18:RETURN:'AND 89Ø DRAW"BD15U15R12FRF4DFD RE2RF 2G2LH2L DGDG4LGL12":XW=28:YW=18: RETURN: 'NAND 900 DRAW"BD16RE2UEU2EU2 HU2HUH2L R13FR2FRF2RF4 G4LG2LGL2GL12":XW= 25:YW=16:RETURN:'OR 91Ø DRAW"BD16RE2UEU2EU2HU2HUH2LR 13FR2FRF2RF4 E2R2F2G2L2H2 G4LG2L GL2GL13":XW=31:YW=17:RETURN:'NOR 920 DRAW"BD16U16FRFRFRFRFRFRFRFR LGLGLGLGLGLG":XW=15:YW=17:RETU RN: 'BUFFER 93Ø DRAW"BD15U15FRFRFRFRFRFRFRF RER2FDGL2HU GLGLGLGLGLGLGLGL":XW =2Ø:YW=17:RETURN:'INVTR 94Ø DRAW"BD17RE2UEU2EU3HU2HUH2LB R4R8FR2FRF2RF4DG4LG2LGL2GL7RE2UE U2EU3HU2HUH2L":XW=24:YW=17:RETUR N: 'XOR 95Ø DRAW"BD16BR2RE2UEU2EU2HU2HUH 2LBR4R8FR2FRF2RF4 RE2RF2G2LH2L G 4LG2LGL2GL8RE2UEU2EU2HU2HUH2L":X W=32:YW=17:RETURN:'XNOR 96Ø DRAW"BD21U19FRFRFRFRFRFRFRFR FRFGLGLGLGLGLGLGLGLGU6 BR3R2LD U2 BU7LR2":XW=19:YW=22:RETURN:'O PAMP 97Ø DRAW"BD8R6NU5ND5E6U2D2G6F5U2 G2R2FD2":XW=12:YW=16:RETURN:'NPN 98Ø DRAW"BD8R6NU5ND5E6U2D2G2U2F2 L2G4F6D2":XW=12:YW=16:RETURN:'PN 99Ø DRAW"BD4R4E2F4E4F4E4F4E2R4": XW=32:YW=8:RETURN:'H-REST 1000 DRAW"BR4D4F2G4F4G4F4G4F2D4" :XW=8:YW=32:RETURN:'V-REST 1010 DRAW"BD4R4NU4ND4BR4NU4ND4R4 ":XW=12:YW=8:RETURN: 'H-CAP 1Ø2Ø DRAW"BR4D4NL4NR4BD4NL4NR4D4 ":XW=8:YW=12:RETURN:'V-CAP 1030 DRAW "BD4BR8 L4H2L2R2F2G2L2 U4":XW=7:YW=1Ø:RETURN:'INPUT 1040 DRAW"BD4R4E2R2D4L2H2":XW=10 :YW=6:RETURN:'OUTPUT 1Ø5Ø DRAW"BD3ER2FD2GL2HU2":XW=8: YW=8:RETURN:'NOT DOT 1060 DRAW "BD3BR2END2RND2RND2FDN L2DNL2GLNU2LNU2HUR2UR2":XW=8:YW= 8:RETURN: 'CON DOT 1070 DRAW"BR4D4L3F3E3L3":XW=8:YW =8:RETURN: GND 1080 DRAW"BD4R5ND4U4F4NG4RNU4ND4

_			
	R5":XW=15:YW=8:RETURN: '>DIODE	125Ø	DRAW"BU2R3":RETURN
	1Ø9Ø DRAW"BD4R5ND4NU4RNF4E4D4ND4		DRAW"BRURD": RETURN
	R5":XW=15:YW=8:RETURN:' <diode< td=""><td>127Ø</td><td>DRAW"UE2U":RETURN</td></diode<>	127Ø	DRAW"UE2U":RETURN
	11ØØ DRAW"BD8R2E2F4E4U6D5NH2NE2D	128Ø	DRAW"U4R3D4L3":RETURN
	F4E4F4E2R2":XW=28:YW=1Ø:RETURN:	129Ø	DRAW"R2LU4G":RETURN
	H-POT	13ØØ	DRAW"NR3U2R3U2L3":RETURN
	111Ø DRAW"BR4D2F2G4F4R6L5NE2NF2L	131Ø	DRAW"R3U2NL2U2L3":RETURN
	G4F4G4F2D2":XW=14:YW=28:RETURN:'		DRAW"BU4D2R3U2D4":RETURN
	V-POT	133Ø	DRAW"R3U2L3U2R3":RETURN
	1111 '		DRAW"NU2R3U2L3U2R3":RETURN
	1112 '	135Ø	DRAW"BU4R3DGD2":RETURN
	1113 ' DRAW (STRINGS) FOR THE	136Ø	DRAW"NU4R3U2NL3U2L3":RETURN
	1114 ' TEXT CHARACTERS	137Ø	DRAW"R3U2L3U2R3D2":RETURN
	1115 '	138Ø	DRAW"RULBU2RUL":RETURN
	112Ø DRAW"BR4":RETURN	139Ø	DRAW"BU4RDLBD2RD":RETURN
	113Ø DRAW"RBU2U2LD2":RETURN	14ØØ	DRAW"BU2NE2F2":RETURN
	114Ø DRAW"BU2U2BR2D2":RETURN	141Ø	DRAW"BUR3BU2L3":RETURN
	115Ø DRAW"BRU4BR2D4URL4RU2LR4":R		DRAW"E2H2":RETURN
	ETURN	143Ø	DRAW"BU3UR3D2LBDD":RETURN
	116Ø DRAW"R3U2L3U2R3LD4":RETURN	144Ø	DRAW"NR3U3ER2BD2LDRU":RETUR
	117Ø DRAW"E4BL3DBR3BD2D":RETURN	N	
	118Ø DRAW"BR2NU4H2R3":RETURN		DRAW"U3ERFDNL3D2":RETURN
	119Ø DRAW"BRBU4D2":RETURN		DRAW"U4R2FGNL2FGL2":RETURN
	12ØØ DRAW"BR2HU2E":RETURN		DRAW"BRREGLHU2ERF":RETURN
	121Ø DRAW"BREU2H":RETURN		DRAW"U4R2FD2GL2":RETURN
	122Ø DRAW"BUE2GHF2":RETURN		DRAW"NR3U2NR2U2R3":RETURN
	123Ø DRAW"BU2R2LUD2":RETURN		DRAW"U2NR2U2R3":RETURN
	124Ø DRAW"BRU2":RETURN	151Ø	DRAW"BU4BR3L2GD2FREUL":RETU

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RN 1520 DRAW"U4D2R3U2D4":RETURN 153Ø DRAW"R2LU4NLR": RETURN 154Ø DRAW"BUFREU3":RETURN 155Ø DRAW"U2RNF2NE2LU2":RETURN 156Ø DRAW"NR3U4":RETURN 157Ø DRAW"U4FRED4":RETURN 158Ø DRAW"U4F3DU4":RETURN 159Ø DRAW"BUU2ERFD2GLH":RETURN 1600 DRAW"U4R2FGL2":RETURN 161Ø DRAW"BUU2ERFD2GNUNRLH": RETU RN 162Ø DRAW"U4R2FGL2RF2":RETURN 163Ø DRAW"R2EHLHER2":RETURN 164Ø DRAW"BU4R2LD4":RETURN 165Ø DRAW"NU4R3U4":RETURN 166Ø DRAW"BU4D3FREU3":RETURN 167Ø DRAW"NU4ERFU4":RETURN 168Ø DRAW"UE2UDGHUDF2D":RETURN 169Ø DRAW"BU4DFEUDGD2":RETURN 1700 DRAW"NR2UE2UL2":RETURN 17Ø1 17Ø2 ' CREATE THE CAD SYSTEM 17Ø3 17Ø4 ' SCREEN (DISPLAY) 17Ø5 171Ø PMODE4,1:SCREEN1,1:COLORØ,1 :PCLS:DRAW"CØS4":TX=14Ø:TY=5:T\$= "NAME: "+NF\$:GOSUBløø:TX=14Ø:TY=

BASIC COMPILER

WANATCHWARE believes that users of the Color Computer deserve the right to use all 64k of RAM that is available in the computer, and have fast machine language programs that use the full potential of the 6809 microprocessor. That is why the BANIC compiler, called MLBANIC was developed. Here are some of the reasons that make this compiler one of the best bargains in this magazine:

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٦.	I/O -Comm	ands				
	CLOSE	CLOADM	CSAVEN	DIR	DRIVE	DSKI\$
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2.	Program C	ontrol Co	ommands			
	CALL	END	EXEC	FOR	STEP	NEXT
	GOSUB	GOTO	IF	THEN	ELSE	ERROR
	ONGO	RETURN	STOP	SUBROUT	TINE	
3.	Math Func	tions				
	ABS	ASC	ATN	cos	CYN	EOF
	EXP	FIX	INSTR	INT	LEN	LOG
	LOC	LOF	PEEK	POINT	PPOINT	RND
	SGN	SIN	SQR	TAN	TIMER	VAL
4.	String Fu	nctions				
	CHR\$	INKEYS	LEFT\$	MIDS	MKNS	RIGHTS
	STR\$	STRING\$				
5.	Graphic/S	ound Com	mands			
	COLOR	CLS	CIRCLE	DRAW	LINE	PAINT
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6.	Other/Spe	cial Com	mands			
	DATA	DIM	LLIST	MOTOR	POKE	READ
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```
172Ø FORX=ØTO6:LINE(X*19+1,1)-(X
*19+2Ø,2Ø), PSET, B:NEXT:LINE(7,27
)-(248,184), PSET, B: LINE (6,26)-(2
49,185), PSET, B:GOSUB176Ø
173Ø FORX=8TO248STEP8:LINE(X,27)
-(X,23), PSET: LINE (X+4,27) -(X+4,2
5), PSET: LINE(X, 184) - (X, 188), PSET
:LINE(X+4,184)-(X+4,186), PSET:NE
XT:LINE(252,23)-(252,191), PRESET
174Ø FORY=28TO184STEP8:LINE(7,Y)
-(3,Y), PSET: LINE(7,Y+4)-(5,Y+4),
PSET:LINE(248,Y)-(252,Y), PSET:LI
NE(248,Y+4)-(25\emptyset,Y+4),PSET:NEXT
175Ø GOSUB179Ø:FORX=8TO248STEP8:
FORY=28TO184STEP8:PSET(X,Y):NEXT
Y,X:GOSUB11Ø:A$=RIGHT$(STR$(PG),
1):DRAW"BM166,13":GOSUB8Ø:RETURN
1751
1752
1753 ' MAIN MENU #1 DISPLAY
1754
176Ø DRAW"BM4,4R6D12R6 BM24,4R12
D12L12U12 BM43,1ØR4NU3D3E3NH3RNU
3ND3R3 BM62,4R2BR3R2BR3R2D2BD3D2
BD3D2L2BL3L2BL3L2U2BU3U2BU3U2 BM
81,4R12L6D12 BM1Ø2,4D4NR6GFNR6GF
NR6GFND4R6ND4EHEHEHU4L6 BM119.8N
D4R6U4F6G6U4L6": RETURN
1761 '
1762
1763 ' MAIN MENU #2 DISPLAY
1764
177Ø DRAW"BM4,1ØE6D4R6D4L6D4H6 B
MlØØ,4Rl2D3L2DR2D8L6U3E2H2LG2F2D
3L5U12D3R6U3 BM28,8U4R4D4L4BD2F2
E2BD4R4D4L4U4BL4L4D4R4U4 BM46,4D
4NR6GFNR6GFNR6GFND4R6ND4EHEHEHU4
L6 BM62,4R4ND12R4ND12R4D4NL12D4N
L12D4L12U12 BM82,4NR3D4R3BDD4R3B
DND4R3D2L2NF2L"
178Ø DRAW"BM122,6R4F2D4GNHFRLHGL
4H2U4E2": RETURN
1781 '
1782
1783 ' DISPLAY A PAGE BY GETTING
1784 ' INFO OUT OF MEMORY AND
1785 ' DRAWING IT ONTO THE
1786 '
       SCREEN
179\emptyset \text{ AD(PG)} = A(PG)
18\emptyset\emptyset D=PEEK(AD(PG)):IF D=\emptyset THEN
RETURN
181\emptyset X=PEEK(AD(PG)+1):Y=PEEK(AD(
PG)+2):AD(PG)=AD(PG)+3:IF D>50 T
HEN 183Ø
182Ø DRAW"BM=X;,=Y;":N=D:GOSUB87
Ø:GOTO18ØØ
```

13:T\$="PAGE:":GOSUB1ØØ:TX=184:TY

=13:T\$="MEMORY:":GOSUB1ØØ

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183Ø IF D<>51 THEN 185Ø 184Ø D=PEEK(AD(PG)): AD(PG)=AD(P G)+1:IF D=255 THEN 1800 ELSE A\$= CHR\$(D):DRAW"BM=X;,=Y;":GOSUB8Ø: X=X+5:GOTO 184Ø 185Ø LX=PEEK(AD(PG)):LY=PEEK(AD(PG)+1):AD(PG)=AD(PG)+21860 IF D=52 THEN LINE(X,Y)-(LX, LY), PSET: GOTO 1800 187Ø IF D=53 THEN LINE(X,Y)-(LX, LY), PSET, B: GOTO18ØØ 1880 IF D=54 THEN LINE(X,Y)-(LX, LY), PRESET, BF: GOTO18ØØ 189Ø IF D<>55 THEN 195Ø 1900 IF LX<X THEN X1=LX:LX=X:X=X 1910 IF LY<Y THEN Y1=LY:LY=Y:Y=Y 192Ø FOR X1=X TO LX STEP 8:Y1=X1 +4:IF Y1>LX THEN Y1=LX 193Ø LINE(X1,Y)-(Y1,Y), PSET:LINE (X1,LY)-(Y1,LY), PSET: NEXT: FOR X1 =Y TO LY STEP8:Y1=X1+4:IF Y1>LY THEN Y1=LY 194 \emptyset LINE(X,X1)-(X,Y1),PSET:LINE (LX, X1) - (LX, Y1), PSET: NEXT: GOTO18 ØØ 1950 IF D<>56 THEN AD(PG)=AD(PG) -5:POKE AD(PG), Ø:RETURN

196 \emptyset GET(X,Y)-(LX,LY),MD,G:LX=AB S(X-LX):LY=ABS(Y-LY):X=PEEK(AD(P G)):Y=PEEK(AD(PG)+1):PUT(X,Y)-(X +LX,Y+LY), MD, AND: AD(PG) = AD(PG) +2 :GOTO18ØØ 1961 ' 1962 ' 1963 ' PRINTOUT (WELL PART OF) 1964 ' ROUTINE, CHECK FOR FREE SPACE ON THE DISK 1965 ' 1966 197Ø PRINT: PRINT" CHECKING FREE D ISK SPACE":X=FREE(Ø):IF X<28 THE N PRINT "NOT ENOUGH ROOM ON THE DISK.":STOP ELSE PRINT "CREATING SUB PAGE IMAGE FILES.": FOR X=1 TO løøø:NEXT 1971 1972 1973 ' FOR EACH PAGE=> DRAW THE 1974 ' PAGE AND THEN SAVE IT 1975 ' AS PRT.PG# WHERE # IS THE 1976 ' PAGE NUMBER 1977 ' 198Ø FOR PG=Ø TO 8:FLS="PRT.PG"+ RIGHT\$(STR\$(PG),1):PMODE4,1:SCRE EN1,1:COLORØ,1:PCLS:GOSUB1790:SA VEM FL\$,&HØEØØ,&H25FF,&HØEØØ:NEX TPG



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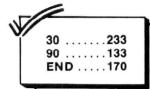
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1981	1
1982	1
1983	' RUN THE REST OF THE
1984	PRINTOUT PROGRAM
1985	
199Ø	RUN "CADPRINT"



Listing 2: CADPRINT

This program is called by the program CoCocad when a schematic printout is performed. The program was written for use with the Gemini-10 printer and will have to be modified if another printer is used.

ø '	
ø ' 1 ' CADPRINT VR 1.Ø 2 ' (C) 1985 BY P.KERCKHOFF	
2 ' (C) 1985 BY P.KERCKHOFF	
3 ' 4335 HENDRIX WAY SAN JOSE CA	
4 '	
5 ' THE PRINTOUT PART OF THE	
6 ' PROGRAM COCOCAD, USED WITH	
7 ' THE GEMINI 10 OR 10X PRINTER	
8 '	
9 1	
1Ø CLEAR1ØØ, &H379A:CLS:PRINT"cad	
print RUNNING": CS=Ø: FOR X=&H379B	
TO &H37FF: READ A\$: D=VAL("&H"+A\$	

):CS=CS+D:POKE X,D:NEXT:READ X:I

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```
F CS<>X THEN PRINT "ERROR IN DAT
A STATEMENTS.":STOP
11 '
12
13
     PICK YOUR BAUD RATE, 1=
14 '
     96ØØ BAUD
15
2Ø POKE15Ø,1
21 '
22
23
     SETUP LINEFEED LENGTH TO
24
     16/144THS OF AN INCH
25
3Ø PRINT#-2,CHR$(27);CHR$(51);CH
R$(16)
31
32
33
     FOR EACH SUB PAGE OF THE
34
     SCHEMATIC (LOOP)
35
4Ø FOR PG=Ø TO 8 STEP 3
41
42
     GET THE PAGES FROM DISK
43
     AND STORE THEM IN MEMORY
44
45
     (UPPER MEMORY)
46
5Ø LOADM "PRT.PG"+RIGHT$(STR$(PG
),1),&H2AØØ
6Ø LOADM "PRT.PG"+RIGHT$(STR$(PG
+1),1),&H42ØØ
7Ø LOADM "PRT.PG"+RIGHT$(STR$(PG
+2),1),&H5AØØ
71
72
73
     CALL THE MACHINE CODE
     PRINTOUT ROUTINE POKED
74
75
     IN EARLIER
76
8Ø EXEC &H379B
81
82
83
     ERASE THE PAGES FROM THE
84 ' DISK AND LOOP UNTIL DONE
85
90 KILL "PRT.PG"+RIGHT$(STR$(PG)
,1):KILL "PRT.PG"+RIGHT$(STR$(PG
+1),1):KILL "PRT.PG"+RIGHT$(STR$
(PG+2),1):NEXT PG
100 PRINT:PRINT"DONE.":STOP
5ØØØØ DATA 86,FE,97,6F,86,1,34,2
,86,1B,AD,9F,AØ,2,86,4B,AD,9F,AØ
,2,86,D4,AD,9F,AØ,2,86,1,AD,9F,A
Ø,2,35,2,8E,7E,EØ,3Ø,86,34,2,8D,
26,35,2,8E,66,EØ,3Ø,86,34,2,8D,1
B,35,2,8E,4E,EØ,3Ø,86,34,2,8D,1Ø
,86,D,AD,9F,AØ,2,35,2,4C,81,1F,2
6,B8,F,6F,39,C6,9C
5ØØ1Ø DATA A6,84,43,34,14,AD,9F,
AØ,2,35,14,3Ø,88,EØ,5A,26,EF,39
5ØØ2Ø DATA
             9974
```

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Listing 3:

This program is a short machine language printer driver that is poked into memory and called by the *Cadprint* program.

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379B 379B 71	379B	99119 99129 BEG	ORG \$: IN JMP	379B START
379E	9965	99139	FDB	DONE-BEGIN
		99149 99159		
		99159 99169	TITLE	CADCODE
		99179		
		99189 * A 99199 * U		TO QUICKEN
		99299	r THE PKI	NIOUT
379B		99219	ORG \$	379В
		99229 99239		
	AAØ2	5 55	OUT EQU	\$A992 COCO'S OUTPUT ROUTINE
	996F	99259 DEV		\$996F =-2 FOR PRINTER
		99269 99279		
			RINT THREE	E SUB PAGES
		99299 * O	JT TO THE	PRINTER
				UD RATE HAS ND PRINTER
		ØØ32Ø * I		ND FRINTER
2700 06		ØØ33Ø		
379B 86 379D 97	FE 6F	ØØ34Ø STAI ØØ35Ø	RT LDA STA	#\$FE SET OUTPUT TO DEVNUM THE PRINTER
379F 86	Ø1	ØØ36Ø	LDA	#1 SET X POS
37A1 34	92	99379 MLO		A SAVE IT, MAIN LOOP
37A3 86 37A5 AD	1B 9F AØØ2	gg38g gg39g	LDA JSR	#27 SET PRINTER UP [CHROUT]
37A9 86	4B	99499	LDA	#75 ESC,K (GRAPHICS MODE)
37AB AD 37AF 86	9F AØØ2	99419	JSR	[CHROUT]
37B1 AD	D4 9F AØØ2	99429 99439	LDA JSR	#212 468 BYTES AT A TIME [CHROUT]
37B5 86	Ø 1	99449	LDA	#1 468/256
37B7 AD 37BB 35	9F AØØ2 Ø2	99459	JSR	[CHROUT]
37BD 8E	7EEØ	99469 99479	PULS LDX	A GET X POS #\$7EEØ BOTTOM SUB PAGE -
37CØ 3Ø	86	99489	LEAX	A,X CALC ADDRESS=>X REG
37G2 34 37G4 8D	Ø2 26	99499 99599	PSHS	A SAVE X POS
37C6 35	g 2	99519	BSR PULS	PRINT GO PRINT BYTES A GET X POS
37C8 8E	66EØ	99529	LDX	#\$66EØ MIDDLE SUB PAGE
37CB 3Ø 37CD 34	86 Ø2	99539 99549	LEAX PSHS	A,X
37CF 8D	1B	gg55g	BSR	A PRINT
37D1 35	92	ØØ56Ø	PULS	A
37D3 8E 37D6 3Ø	4EEØ 86	99579 99589	LDX LEAX	#\$4EEØ TOP SUB PAGE
37D8 34	Ø2	ØØ59Ø	PSHS	A,X A
37DA 8D	19	99699	BSR	PRINT
37DC 86 37DE AD	ØD 9F AØØ2	99619 99629	LDA JSR	#13 A CR/LF [CHROUT]
37E2 35	g2	gg63g	PULS	A GET X POS
37E4 4C	1.0	99649	INCA	
37E5 81 37E7 26	1F B8	99659 99669	CMPA BNE	#31 DONE? MLOOP NOPE, LOOP
37E9 ØF	6 B	99679	CLR	DEVNUM YEP, SET OUTPUT FOR SCREEN
37EB 39		gg68g	RTS	EXIT TO BASIC
37EC C6	9C	99699 99799 PRIN	T I.DR	#156 Y COUNTER
37EE A6	84	ØØ71Ø PLOO		,X GET BYTE
37FØ 43	17	99729	COMA	INVERT BITS
37F1 34 37F3 AD	14 9F AØØ2	99739 99749	PSHS JSR	B,X SAVE REG'S [CHROUT] PRINT BYTE
37F7 35	14	99759	PULS	B,X
37F9 3Ø	88 EØ	99769	LEAX	-32,X NEXT Y ADDRESS
37FC 5A 37FD 26	EF	99779 99789	DECB BNE	DONE ALL Y'S? PLOOP NOPE, LOOP
37FF 39		gg79g	RTS	YEP, RETURN
		99899 99899		
	38ØØ	99819 99829 DONE	EQU	¥
	gggg	ØØ83Ø	END	

Listing 4: REMOVREM

This program will remove lines not evenly divisible by 10 from a program on disk saved in the ASCII format. (The program is used to remove the comment lines from COCOCAD. REM.)

```
Ø
 REMOVREM
1
2
  ' A VERY SIMPLE REMARK
3
   REMOVER PROGRAM. REMOVES
4
    LINES NOT EVENLY DIVISABLE
5
  BY TEN.
6
7
    (C) 1985 P.KERCKHOFF
8
9
1Ø CLEAR 5ØØ
11
12
     OPEN THE OLD PROGRAM AS
13
14
     AN ASCII FILE
15
   OPEN "I", #1, "COCOCAD. REM"
2Ø
21
22
23
     OPEN A FILE FOR THE NEW
24
     PROGRAM TO GO INTO
25
3Ø OPEN "O", #2, "COCOCAD. BAS"
31
32
   ' IF END OF THE FILE THEN
33
   ' WE'RE ALL DONE
34
35
4Ø IF EOF(1) THEN 8Ø
41
42
   ' GET THE DATA FROM THE OLD
43
   ' FILE (PROGRAM)
```

Hint . . .

ONGOing Error Trapping

When you use an ON. . . GOTO or ON . . . GOSUB statement on the CoCo, you don't need to check for an out-of-range value. If the value presented is out of range, BASIC will skip the statement and jump to the next one. Here's an example:

10 INPUT "YOUR CHOICE";D 2Ø ON D GOTO 5Ø,7Ø,9Ø,11Ø:GOTO 1Ø

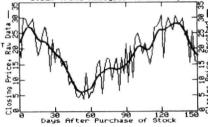
If a number outside the range (here, less than '1' or greater than '4') is put in, the statement will be skipped and the next one (GOTO 10) will loop back to the INPUT statement.

> Fred Kolesar Westfield, PA

45 5Ø LINEINPUT #1,A\$ 51 52 53 IF THE LINE NUMBER IS NOT ' EVENLY DIVIS. BY TEN THEN 54 DON'T SAVE IT IN THE NEW 55 FILE (PROGRAM) 57 $6\emptyset$ IF $VAL(A\$) <> INT(VAL(A\$)/1\emptyset)*1$ Ø THEN PRINT "REMOVED LINE: "; VA $L(A\$):GOTO 4\emptyset$ 61 62 ' ELSE THE LINE IS GOOD SO 63 64 ' SAVE IT IN THE NEW FILE 65 7Ø PRINT #2,A\$:GOTO 4Ø 71 72 73 ALL DONE. CLOSE IT AND 74 STOP. 75 8Ø CLOSE 9Ø PRINT "NOW LOAD 'COCOCAD.BAS' AND RESAVE (THE LOAD WILL TAKE QUITEAWHILE)." 9 100 STOP

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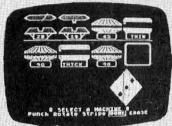
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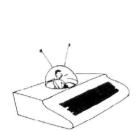


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EARTH TO ED





Reversing The Screen — Revisited

By Ed Ellers Rainbow Technical Editor

• I read your reply to the first letter in the August 1985 issue. Your method of turning all of the graphics screen to an inverse color (white to black, etc.) is good but slow. I have a faster way by using the NOT function of PUT. Here is my listing:

5 'EL WHITE TO BLACK PROGRAM INV ERSING: BY DAVID KELLER

10 DIM IN(108)

15 PMODE 4,1

20 SCREEN 1,1

25 FOR X=0 TO 192 STEP 17

30 PUT(0,X)-(255,X+16), IN, NOT

35 NEXT X

40 GOTO 40

David Keller Fort Mill, SC

Thanks for the program. My own sample was just an attempt to show how it can be done; there's always room for experimentation and improvement.

A Rumor Behind Its Time

• My question is about a rumor I heard about the new Disk BASIC 1.1 ROM coming out; if this is true or if

(Ed Ellers, a RAINBOW and PCM staff member, is a self-confessed electronics fanatic whose other interests include science fiction.) it already came out, what does it have over Disk BASIC 1.0?

Rick Cadorette Biddeford, Maine

Disk BASIC 1.1 has been around since late 1983. The only advantage it has is a DOS command for booting OS-9. Many of the routines in 1.1 have been moved from their 1.0 locations, and quite a few programs that used them directly did not work with 1.1. For this reason I recommend sticking with 1.0.

Is It Extended, or Something Else?

• I am 9 years old and just love to play with Dad's CoCo. When the new RAINBOW comes, I grab it and type in the "One-Liner Contest" listings from it. Sometimes they will not fit in, and my dad does something called "edit" and then they will fit. Dad says his computer is Extended and very long "packed" lines cannot be put into a standard computer. Can this be so?

What do all the people without Extended do?

Natasha Swaine Hantsport, Nova Scotia

That trick (using the EDIT mode to squeeze a few extra characters in) is

quite common in our "One-Liners." Your father is right in that EDIT is an Extended BASIC command and isn't available on the "standard" models. I suspect, though, that a program that's been packed in this way is likely to have been written for Extended BASIC anyway. At any rate, those without Extended Color BASIC can always divide the One-Liner into two shorter lines in order to use them.

Reversed in Some Respects

• I decided to try a hardware project in your April 1985 issue, the video reverser modification ("Turn Your Monitor Inside Out," Page 116). The project is relatively simple and after completing it, it worked fine, except when I went to the edit mode of Telewriter-64. The screen was again white with black lettering. My question is, is this normal, and if so, why?

> Bill Spillane Phoenix, AZ

The video reverser project simply forces the 6847 video chip, when it's in text mode, to use the green-on-black

characters instead of black-on-green. Telewriter's edit mode uses the PMODE 4 Hi-Res screen, which is unaffected.

Forbidden Variables

When I have attempted to use the string variable designated as FN\$. I get an error message. Why?

> Marc A. Schenider, Psy.D. Evanston, IL

Some of Microsoft's several BASICs designed for various computers (including the CoCo's BASIC) are set up so you can't use variable names that are the same as commands or functions. In this case, Extended command DEF FN precludes the use of FN as a variable name. Later BASICs, like the BASIC on the IBM PC, let you do this, but these also make you type a space between a command word and the rest of the command (such as FOR N = 1 TO 10. instead of FORN=1TO10).

Limousine that Won't Start

 In the January 1984 RAINBOW, Page 48, there is a disk utility for transferring programs from tape to disk. At the time I didn't have a disk system, so it has sat in my RAINBOW ON TAPE cassette for over a year. I now have a disk system and have need to use the program, only to find that it won't work. What happens is the program EXECs, a question mark and some graphics characters appear in the first four of five columns in the upper left corner of the screen, and the cassette player motor starts. The computer is locked up at this point.

I have wondered if there is an error in the program. I have not been able to locate the February or March 1984 issues to see if there is an errata. Could you please check for me?

Larry Cole Bemidji, MN

The program in the magazine is correct, but in the process of making that month's RAINBOW ON TAPE, that file was damaged. The correct program (TPTDSK) was appended to the February 1984 RAINBOW ON TAPE, and (if I may be permitted a plug) anyone who needs to transfer tape files to disk will do well to consider it.

Modem Matters

What happens to the modem signal when it enters the serial I/O port? How is it processed, and in which memory locations? I am thinking of making a communications program. I want to know how the other programs access the serial I/O port, and how they translate all of those beeps into characters and characters into beeps.

Robert Davis Winnipeg, Manitoba

First of all, the "beeps" are handled in the modem, which takes DC signals from the computer and translates them into tones while translating the tones from the other end into DC signals for the computer. (In RS-232 interfaces, a 'I' is represented by a positive voltage of three volts or more; a '0' is represented by a negative voltage, not by zero voltage as in a computer's own logic circuitry.)

The CoCo handles serial I/O using an inexpensive method that, unfortunately, makes terminal programs more complex. The serial input and output signals (shifted to the standard "TTL" levels) are connected to two input and output lines on the second PIA (Parallel Interface Adapter) chip. Input is fed to input bit 0 of Port B (at address FF22 Hex); output comes from output bit 1 of Port A (at FF20 Hex). This means the microprocessor itself has to take care of the Baud rate, number of start and stop bits and such. Understandably, this makes serial I/O on the CoCo somewhat unreliable and slow, especially when both sending and receiving are involved.

Many other computers use a circuit called a "Universal, Asynchronous Receiver/Transmitter" (UART for short), which can be programmed to take care of the Baud rate and number of bits automatically. The processor then sends the data to be sent out to the UART in parallel form and the UART sends it out serially, while also taking incoming serial data and converting it to parallel to send to the processor. Tandy's Deluxe RS-232 Program Pak and some other packs provide UART-based RS-232 ports for the CoCo, which make modem and other operations more reliable and faster as well as freeing up the CoCo's serial port for printer hookup.

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by Jeff Stevens

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by John Ashurst

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CoCo Community

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Please let us know if we have omitted any clubs an send us complete up-to-date addresses. Only those clubs which have signed our "agreement form" will appear in this listing of CoCo Clubs. Also, please notify us if you wish to add or delete any names on this list. Send your information to:

CoCo Clubs THE RAINBOW The Falsoft Building P.O. Box 385 Prospect, KY 40059

ALABAMA

- Birmingham Alabama Color Computer Club, Robert Matthews, 3529 Laurel View Lane, Birmingham, 35216, (205) 933-0887
- Huntsville Color-80 Users Group, Randy Niemann, 1011 Versailles Dr., S.E., Huntsville, 35803, (205) 882-2485

ALASKA

Alaska Color Computer Users' Group, Rick McDannel, 430C Beluga Ave., Ft. Richardson, 99505, (907) 428-0392

ARIZONA

- Huachuca Hot Pokers, James Standley, 235-A Jeffords Street (NBU-96H), Ft. Huachuca, 85613, (602) 458-8338
- Tucson Color Computer Club, Marshall R. Madole, 3721 S. Le Beaux Place, Tucson, 85730

ARKANSAS

Central Arkansas CoCo Club, Melinda Braslovsky, 1203 Erving Rdg., LP Cabot, 72023, (501) 982-8854

CALIFORNIA

- Color America Users Group, Mark Randall, 2227 Canyon Rd., Arcadia, 91006, (213) 355-6111
- Los Angeles-Wilshire Color Computer Users' Group, Norm Wolfe, P.O. Box 11151, Beverly Hills, 90213
- The Davis CoCoNuts, Adam Sherman, 1818 Haussler Dr., Davis, 95616, (916) 758-3195
- Sacramento Color Computer Club, Wayne Chrisope, P.O. Box 9, Elverta, 95626
- North American CoCo Orange County, Eric Wilson, 8405 Sweetwater Circle, Huntington Beach, 92646, BBS (714) 847-2268
- Joe Bennett, 1169 Florida Street, Imperial Beach, 92023, (474-6213)
- CoCoholics and Tandy Computer Club, Kenneth M. Denny, 801 W. Roseburg Ave., Suite 200, Modesto, 95350, (209) 523-5176
- Ventura County Color Computer Club (VC4), John Bascue, Oxnard Public Library, 214 "C" Street, Oxnard, 93030, (805) 987-4752 or DATA (805) 484-5491
- Sacramento CoCo Club, Charles Doughty, Box 60511, Sacramento, 95860
- Salinas Color Computer Club, Larry Livingston, 501 Monterey Highway, Salinas, 93908, (408) 484-9697
- Citrus Color Computer Club, Joseph Kohn, P.O. Box 6991, San Bernadino, 92412, (714) 792-8721
- The MC-10 Newsletter Club, Jose J. Bray, 4730 Cass Street, San Diego, 92109, (619) 483-8744
- Local Color—A CoCo Club of San Francisco, Andrew G. Kieval, P.O. Box 421242, San Francisco, 94142
- San Joaquin CoCo Club, Steven Paul Moreno, P.O. Box 99024, Stockton, 95209, (209) 951-3938
- Silicon Valley Color Computer Club, Shawn Jipp, P.O. Box 61593, Sunnyvale, 94088, (408) 749-1947
- CoCo Nutz Computer Club, Walter V. Seay, 68-461 Highway 86, Thermal, 92274, (619) 397-4252
- Conejo Color Computer Users Group, Robert S. Rimmer, 472 Sundance Street, Thousand Oaks, 91360, (805) 492-4972
- South Bay Color Computer Club, Karen Schlotzhauer, 23113 Dana Ave., Torrance, 90501, (213) 539-2539

COLORADO

- Lowry Microcomputer Club/CoCo Users' Group, Jerry D. Surritte, 2249 Moline St., Aurora, 80010, (303) 343-3273
- Colorado Color Computer Club, Joe Applegate, P.O. Box 33492, Northglenn, 80233, (303) 650-9768

FLORIDA

- Northwest Florida CoCo Nuts, William N. Lamb, P.O. Box 1032, Fort Walton Beach, 32549, (904) 244-5281
- Alachua County CoCo Special Interest Group, Chris Meyers, P.O. Box 14927, Gainesville, 32604, (904) 378-9598

- Jacksonville Color Computer Club, William H. Brown III, 2411 Hirsch Ave., Jacksonville, 32216, (904) 721-0282
- CoCo Chips Color Computer Club, 6 Belle Mead Circle, Largo, 33540, (813) 581-7779
- Broward County Color Computer Club, Timothy D. Neary, 510 S.W. 64th Ave., Margate, 33068, (305) 972-4074
- South Brevard Color Computer Club, Benjamin S. Jerome, 496 Hillside Court, Melbourne, 32935, (305) 259-4609
- The Naples CoCo Club, Matt Tari, 3320 7th Avenue S.W., Naples, 33964, (813) 455-4830
- Color-6809 Users Group, Emery Mandel, 4301 11th Avenue North, St. Petersburg, 33713, (813) 323-3570
- C.C. Club of Sarasota, Ernie Bontrager, 4047 Bee Ridge Rd., Sarasota, 33582, (813)921-7510
- Broward CoCo Club, Sue Spahn, 11950 N.W. 29th Manor, Sunrise, 33582, (305) 741-4737

IDAHO

CoCo-AG Farm Computer Users Group, Kelly Klass, Rt.1, Box 4133, Twin Falls, 83301, (208) 733-4251

ILLINOIS

- Glenside Color Computer Club, Ed Hathaway, 8 W. Stevenson Drive, Glendale Heights, 60139, (312) 462-0694
- Town & Country CoCo, 5461 S. Kenwood, Chicago, (312) 493-3748
- Cook County Color Computer Club, Tim Powers, 1633 Fifth Ave., Chicago Heights, 60411, (312) 747-7062
- Illinois Color Computer Club of Elgin, Steven Stroud, 1098 Florimond Dr., Elgin, 60120, (312) 695-3186
- Kitchen Table Color Computer Group, Robert Mills, P.O. Box 464, Hanover, 61041, (815) 591-3377
- Northern Illinois Color Computer Club, 580 Milton Lane, Hoffman Estates, 60194, (312) 885-2573
- Peoria Color Computer Club, Lawrence Parker, 418 Lakemper Dr., Metamora, 61548, (309) 383-4312
- Motorola Microcomputer Club, Steve Adler, 1301 Algonquin Rd., Schaumburg, 60196, (312) 576-3044
- Chicago OS-9 Users Group, 480 Gilbert Drive, Wood Dale, 60191, (312) 860-2580

INDIANA

- Evansville Color Computer Users Group, Dave Jenkins, 1418 E. Illinois Street, Evansville, 47711, (812) 424-0099
- Three Rivers Users Group, George Barber, 2410 New Haven Ave., Fort Wayne, 46815
- Indy Color Computer Club, Mike Davis, P.O. Box 68702, Indianapolis, 46268, (317) 257-3300
- Southern Indiana Computer Club, Route 1, Box 459, Mitchell, 47446
- CoCo Program, Erik Merz, 310 Appletree Dr., Noblesville, 46060, (317) 842-1340

IOWA

- Metro Area Color Computer Club, K.L. Knudtzon, 3324 11th Ave., Council Bluffs, 51501
- Mid Iowa CoCo, Terry Simons, 1328 48th Street, Des Moines, 50311, (515) 279-2576
- Dubuque Tandy Users Group, Wesley Kullhem, 1995 Lombard, Dubuque, 52001, (319) 556-4137
- Iowa City TRS-80 Users Group, Susan Chapler, R.R. 6, The Woods, Iowa City, 52240, (319) 351-5959

KANSAS

- Kansas City CoCo Club, Mike Allinder, P.O. Box 11192, Kansas City, 66111, (913) 287-1904
- Topeka Color Computer Club, Kevin Cronister, 2224 Hope, Topeka, 66614, (913) 272-1353
- Color Computer Club of Wichita, Rex Rivers, 1205 N. Mosley, Wichita, 67214, (316) 264-9193
- Walnut Valley C.C. Users Club, David Anderson, 1212 E. 4th St., Winfield, 67156, (316) 221-0040

KENTUCKY

Perry County CoCo Users Group, Keith W. Smith, General Delivery, Hardburly, 41747, (606) 439-4209 LOCO-COCO, Mike Standefer, 3141 Doreen Way, Louisville, 40220, (502) 458-6690

LOUISIANA

Red Stick Color Computer Club, Gary Cash, 8929 Metairle Drive, Baton Rouge, 70810, (504) 293-7799

Cajun CoCo Club, Bob Hoevel, 104 Karen St., New Iberia, 70560, (318) 365-7706

MASSACHUSETTS

Greater Boston Super Color Users Group, Robert Biamonte, 6 Boulder Drive, Burlington, 01803

New England C.C. Users Group, Christopher E. Sweet, R.D. 2, Box 261, Harvard, 01451, (617) 456-8291

Massachusetts CoCo Club, Jason Rahaim, Spring St., Lunenberg, 01462, (617) 582-6514

6809'ers, Jean Salvas, 204 East Street, Springfield, 01104, (413) 734-5163

MICHIGAN

Petoskey Area CoCo Club (PAC3), Dennis Hoshield, 670 Liegl Drive, Alanson, 49706, (616) 347-0607

Color C.H.I.P.S., Jack Pieron, 3175 Oakhill Place, Clarkston, 48016, (313) 627-4358

Greater Lansing Color Computer Users Group, P.O. Box 14114, Lansing, 48901

Midland C.C. Club, Neil Drake, 709 Coolidge, Midland, 48640, (517) 631-2939

Michiana CoCo Club, Clay Howe, 310 S. Jefferson St., Sturgis, 49091, (616) 651-4248

MISSISSIPPI

Singing River C.C. Club, Mark Welch, 3605 Vancleave Rd., # 118, Gautier, 39553

CoCo Art Club, Joel Bunyard, Rt. 7, Box 10, Meridian, 39301, (601) 483-0424

MISSOURI

North County 80 Group, Tom Vogel, 12 Ville Donna Ct., Hazelwood, 63042, (314) 739-4078

Mid-America Color Computer User's Group, Jerry Morgon, 807 Ponca Drive, Independence, 64056, (816) 796-5813

Coconuts, 1610 N. Marlan, Springfield, 65803

MONTANA

Billings C.C. Club, Jayne Kenyon, 4306 Phillip, Billings, 59101

NEBRASKA

TRS-80 Color Computer Users Group of Lincoln, Jonathan Skean, 2629 South 15th St., Lincoln, 68502, (402) 475-9815

NEW JERSEY

Intrasoft, Ravi Sakaria, 139 Candace Lane, Chatham Twp., 07928, (201) 635-8025

The Kid CoCo Club, Derrick Kardos, 11 Regal Drive, Colonia, NJ 07067, (201) 382-6862

Bug 80 Users' Group, George R. Miller, Jr., Box 62, Glen Gardner, 08826

Garden State Color Computer Users Group, Darren Nye, 5 North 20th Ave., Manville, 08835; Voice (201) 725-8385, Data (C.C.I.E. BBS) (201) 725-5028

Loco CoCo Club, Bud Lavin, 73B Wavercrest Ave., Winfield Park, 07036

NEW MEXICO

Chaves County Color Computer Club, Lee Mitchell, 1102 Melrose Drive, Roswell, 88201, (505) 623-0789

NEW YORK

Adirondack CoCo Club (Albany Chapter), Ron Fish, Box 4214, Albany, 12204

Adirondack CoCo Club, (Athens Chapter), Pete Chast, P.O. Box 61, Athens, 12015

Adirondack CoCo Club (Glens Falls Chapter), Dave and Richard Mitchell, 39 Center St., Fort Edwards, 12828

Queensboro Color Computer Club, Bob Rosen, Springfield Blvd. & 56th Ave., Bayside, 11364, (212) 631-6233

Local CoCo, Charles Martin, P.O. Box 901, Bellmore, 11710

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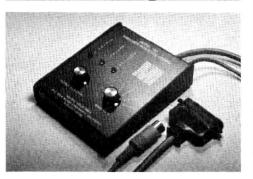
The Model 102 has 3 switch positions that allow you to switch your computer's serial output between 3 different devices (modem, printers or another computer). The 102 has color coded lights that indicate the switch position. These lights also act as power indicators to let you know your computer is on. Supplied with the 102 are color coded labels that can be applied to your accessories. The 102 has a heavy guage anodized aluminum cabinet with non-slip rubber feet.

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- C.C. Club of Central N.Y., Joseph Short, 248 S. Fourth Ave., Ilion, 11357, (315) 895-7730
- Rockland County Color Computer Users Group, John S. Scibran, P.O. Box 131, Monsey, 10952, (914) 357-5580
- Olean Area CoCo Users Group, Herman L. Smith, P.O. Box 216, Olean, 14760, (716) 372-1170 or 372-3121
- The CoCo Clan, John David, 56 Willowwood Lane, Staten Island, 10308, (718) 317-6228
- New York Color Computer User Group, Carl Glovinsky, 15 Bolivar St., Staten Island, 10314, (718) 761-0268

NORTH CAROLINA

- TRS-80 Users' Group of Charlotte, Jason Foodman, 240 Medearis Dr., Charlotte, 28211
- Bull City CoCo Users Group, Todd Wall, 5319 Durand Drive, Durham, 27703, (919) 598-1348
- Raleigh Color Computer Club, David Roper, P.O. Box 681, Garner, 27529

NORTH DAKOTA

Musica 2 Users Group (MUG), Solveig Pederson, 711 3rd Street S.E., Valley City, 58072, (701) 845-5063

оню

- CoCo Club of Youngstown, Timothy McFadden, P.O. Box 478, Canfield, 44406, (216) 788-4218
- Columbus & Central Ohio Color Computer Club, D.E. Sparrow, 19 E.N. Broadway, Columbus, 43214, (614) 268-5366
- Dayton CoCo Users' Group, Joseph P.Evans, 609 Applehill Dr., W. Carrollton, 45449
- Cincinnati TRS-80 Users Group, R.A. White, 44 Dow Court, Fairfield, 45014
- Dayton Are Color Computer Users Group, David R. Barr, 2278 Yorkshire Pl., Kettering, 45419, (513) 293-2228
- M.U.G. of CoCo—Middletown Users Group, James Carr, Middletown, 45042, (513) 424-6905
- Greater Toledo Color Computer Club, Ronald L. Hall, 9646 Garden Road, Monclova, 43542, (419) 865-3663
- Northeastern Ohio (N.E.O.) CoCo Club, Tony Rugue, 527 Malvern Drive., Painsville, 44077, (216) 354-2736
- Tri-County Computer Users Group, William J. Loeffler, 2612 Dale Avenue, Rocky River, 44116, (216) 356-0779
- Miami Valley CoCo Club, R. Douglas Wales, 2065 LeFeure Rd., Troy, 45373

OKLAHOMA

CoCo Inc., Robert L. Pace, 1726 W. Rose Oak Dr., Mustang, 73064, (405) 376-3569

OREGON

Willamette Valley CoCo Users, Brian James, P.O. Box 11468, Eugene, 97440, (503) 687-9286

PENNSYLVANIA

- HUG-A-CoCo, George Lurie, 2012 Mill Plain Court, Harrisburg, 17110, (717) 657-2789
- Penn-Jersey Color Computer Club, P.O. Box 2742, Lehigh Valley, 18001
- CAPATUG, Inc., 340 Lewisberry Rd., New Cumberland, 17070, BBS (717) 774-6543
- Skyline Color Computer Club of Berks County, Lewis F. Brubaker, 4874 Eighth Ave., Temple, 19560, (215) 921-3616
- Pittsburgh Color Group, William Tucker, P.O. Box 351, West Mifflin, 15122, (412) 466-3078

RHODE ISLAND

New England CoCo Nuts, P.O. Box 6604, Providence, 02940

SOUTH CAROLINA

- Invitation Software Group, Tom Reed, 3562 Linbrook Dr., Columbia, 29204, (803) 786-0541
- Midlands 80 Computer Club, Tommy Sanders, P.O. Box 7594, Columbia, 29202, BBS (803) 755-3414
- Metropolitan Greenville CoCo Club, Ed Lowe, P.O. Box 6, Gray Court, 29645, (803) 876-3928

- Hilton Head Island CoCo Club, Kevin Clark, P.O. Box 6187, Hilton Head Island, 29928, (803) 785-9630
- Spartanburg County CoCo Club, Dennis Shattuck, 473 Royal Oak Drive, Spartanburg, 29302, (803) 583-3017

TENNESSEE

- Chattanooga CoCo Club, Jim Perkins/Jim Cox, P.O. Box 9825, Chattanooga, 37412, (615) 870-2439
- Foothills Micro-Computer Club, Aaron Sentell, Route 14, Box 289, Maryville, 37801, (615) 982-
- Memphis Color Computer Users Group, Ben Barton, 4903 Warrington Rd., Memphis, 38118, (901) 795-7075 or 362-5945

TEXAS

- CoCo User Group, David Karam, 1809 Dexter, Austin, 78704, (512) 442-6317
- B/CS Color Computer Users Group, Dale Cuthbertson, 1812 Michael Lane, Bryan, 77801, (409) 822-0731
- Deer Park Color Computer Club, Donald Burr, 4314 W. Grant, Deer Park, 77536, (713) 479-5313
- International Color Computer Club, Inc., Robert L. Garrett, 2101 East Main Street, Henderson, 75652, (214) 657-7834
- TRS-80 Users Group of New Braunfels, John Mendez, 408 Acorn, New Braunfels, 78130, (512) 629-3207

UTAH

- Ogden CoCo, Kathy Rush, 4535 S. 2600 W. Roy, Ogden, 84067
- Salt City CoCo Club, Dennis Mott, 720 E. Browning Ave., Salt Lake City, 84105, (801) 487-6032

VIRGINIA

- Northern Virginia C.C. Club, Bruce Warner, 14503 Fullerton Road, Dale City, 22193, (703) 670-4962
- Central Virginia Color Computer Club, Lane Lester, 413 Woodland Circle, Lynchburg, 24502, (804) 237-4188

WASHINGTON

Northwest Computer Club, Larry Haines, East 2924 Liberty, Spokane, 99207, (509) 483-5547

WEST VIRGINIA

- Kanawha Valley Personal Computer Club, P.O. Box 5354, Charleston, 25311, BBS (304) 925-3338 or 345-6502
- Mtn. State CoCo Users Group, Donald G. Barber, Jr., P.O. Box 1084, Morgantown, 26507, (304) 599-4493
- Mil-O-Bar Computer Club, Jim LeMaster, P.O. Box 130, Ona, 25545, (304) 743-4752 after 4 p.m.
- Blennerhassett CoCo Club, David Greathouse, Rt. 9, Box 119, Parkersburg, 26101
- West Virginia Color Computer Club, William Mucklow, 949 Baier Street, St. Albans, 25177, (304) 727-6764

WISCONSIN

- CoCo-MUG, Tom Fandre, P.O. Box 10152, Milwaukee, 53210, (414) 542-0600
- Southern Wisconsin CoCo Club, David C. Buehn, P.O. Box 411, Twin Lakes, 53181

CANADA

ALBERTA

- Calgary Color Computer Club, Don Towson, 832 Cannell Rd. S.W., Calgary, T2W 1T4, (403) 281-2855
- Edmonton CoCo Users Group, Dexter Dombro, P.O. Box 4507 Stn. South, Edmonton, T6E 4T7, (403) 461-4750
- Medley Computer and Electronics Club, P.O. Box 1267, Medley, T4A 2M0

NEW BRUNSWICK

Color Computer Moncton Users Group (CoCoMUG), Leo Allain, 91 Woodland Dr., Moncton, E1E 3C4, (506) 382-2190

BRITISH COLUMBIA

- North Island CoCo Club, Ann Marie MacKay, P.O. Box 1740, Port Hardy, B.C., V0N 2P0
- Salmon Arm CoCo, David Coldwell, 2981 N. Broadview, Salmon Arm, B.C., V0E 2T0, (604) 832-8247

MANITOBA

Winnipeg Micro-80 Users Group, Mel Seder, 884 Ash St., Winnipeg, R3N 0R9, (204) 284-0376

NEWFOUNDLAND

Avalon CoCo Club, A.R. Thompson, 10 Foran St., St. John's, A1E 4G1

NOVA SCOTIA

Halifax Dartmouth CoCo Users Group, P.O. Box 572, Dartmough, B2Y 3Y9, (902) 469-3656

ONTARIO

- International Adventurer's Club, Maurice Dow, 84 Camberley Cres., Brampton, L6V 3L4
- K-W C.C. Club, Peter Karwowski, 23 Hudson Crescent, Kitchener, N2B 2V7
- London CoCo Nuts Computer Club, Harry K. Boyce, 180 Concord Road, London, N6G 3H8, (519) 472-7706
- Meadowvale Color Computer Club, Howard Porter, P.O. Box 186, Streetsville, Mississauga, L5M 2B8
- Niagara Regional CoCo Club, Harry VanDyke, 7707 Jubilee Drive, Niagra Falls, L2G 7J3
- Ottawa 6809 Users Group, Norm Shoihet, 1497 Meadowbrook Road, Ottawa, K1B 5J9, (613) 741-1763

QUEBEC

- Club d'Ordinateur Couleur du Quebec, Inc., Jean-Marie Beaujean, Centre de Loisirs St-Mathieu, 7110- 8e Ave., St-Michel, Montreal, H2A 3C4, (514) 270-7507
- South Shore CoCo Club, Jacques Bedard, 33 Lisilre, St-Constant, P.Q., J0L 1X0
- Le Club Couleur du Nord, Gabriel Pigeon, RR 2, Ville Montel, J0Y 2S0, (819) 732-2346

SASKATCHEWAN

- Regina Color Computer Club, Georges Glass, 26 Tweedsmuir Bay, Regina, S4X 2B1, (306) 949-3942
- Saskatoon Color Computer Club, L. Curtis Boyle, 35 Bence Crescent, Saskatoon, S7L 4H9

AUSTRALIA

- Blacktown City TRS-80 Colour Computer Users Group, Keith Gallagher, P.O. Box 264, Riverstone, New South Wales, 2765
- CoCo Colyteens of Colyton, Dwayne Manson, P.O. Box 506, St. Marys, New South Wales, 2760
- Color Computer Penrith User Group, Alexander Schofield, 15 Tasman Avenue, Lethbridge Park, New South Wales, 2770
- The Hills District Color Computer Club, Andrew Rankin, 42 Lucas Road, Seven Hills, New South Wales, 2147, phone (02) 674-3741
- CoCoHUG (Color Computer Hobart Users Group), Robert Delbourgo, 15 Willowdene Avenue, Sandy Bay, Hobart, Tasmania, 7005

MEXICO

MEXCOCO Users Group, Sergio Waisser, Pachuca 87-109, Mexico City D.F., 06140, phone 553-11-

WEST GERMANY

First CoCo Club Hamburg, Theis Klauberg, 2000 Hamburg 65, Op de Solt 53 a, West Germany

new clubs

Editor:

I'd like to announce the formation of The CoCoholics and Tandy Computer Club of Modesto. We hold meetings once a month and ask that anyone who joins pay an annual fee of \$18 to help publish our *COLOR* newsletter. For more information write us at 801 W. Roseburg Ave., Suite 200, 95350.

Ken Denny Modesto, CA Editor:

For information about joining the Orange County TRS-80 Users Group write to 10112 Melody Park Drive, 92640.

> Fred K. Wright Garden Grove, CA

Editor:

The Color Computer Club of Riverview holds monthly meetings on the second Friday of each month at 7 p.m. We have a bimonthly newsletter. The club offers programming help, hardware hacking and any information or assistance available. Write to 13002 Lincoln Road, 33569.

Riverview, FL

Editor:

This letter is to inform you of the existence of the Color-6809 Color Computer Users Group. We have about 50 members and meet the third Monday of each month. Usually, we have a speaker at our meetings. We publish a newsletter once a month and have both public domain software and firmware libraries. All residents of Pinellas, Hillsborough, Pasco and other counties of Florida are welcome to attend our meetings; anyone is welcome to inquire with us for further information about our club. Write to 4301 11th Avenue North, 33713 or call (813) 323-3570.

> Emery Mandel St. Petersburg, FL

Editor:

I am happy to announce the formation of a new CoCo club in the Hazard-Perry county area called the Perry County CoCo Users Group. Inquiries about the club should be sent to General Delivery, 41747.

Keith W. Smith Hardburly, KY

Editor:

The Greater Kalamazoo Color Computer Club meets the third Wednesday of every month in the Community Room of the Crossroads Mall. The meetings start at 7:30 p.m. Along with club meetings we publish a newsletter. The club also has a 150program public domain library. For more information call Mike at 657-3850 or Jim at 344-7631.

> Michael Marcelletti Paw Paw, MI

Editor:

A new national CoCo Art Club is starting in Meridian. We plan to have a monthly newsletter, discount prices on software. contests, a CoCo gallery (similar to THE RAINBOW's), software library, BBS/DATA library (just for art) and many other features. If anyone has any ideas or would like to become a member please write to CoCo Art Club, Rt. 7, Box 10, 39301.

Joel Bunyard Meridian, MS

I am interested in starting a Color Computer club in the St. Louis county area. Anyone interested can contact me after 5 p.m. at (314) 739-0326 or write to 11826 Gay Glen Drive, 63043.

> Jav Harris Maryland Heights, MO

Editor:

This is to announce a new chapter in the Adirondack Color Computer Club. The Greene County chapter meets in the Athens Elementary School the second and fourth Thursday of each month at 7 p.m. during the school year.

We have chapters in Glens Falls, Fort Edward, Albany and now Greene County. Our members are widespread and we are constantly looking for more people to organize new chapters. Write to P.O. Box

61, 12015.

Pete M. Chast Athens, NY

Editor:

I would like to announce the formation of the New York Color Computer Group. The club meets on the second Thursday of each month at Clove Lakes Nursing Home, Fanning Place in Staten Island. The meeting time is 7 p.m. For more information please send an SASE to P.O. Box 626, 10314.

> Brian Twomey Staten Island, NY

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Editor:

The Rockland County Color Computer Users Group holds monthly meetings at the Cooperative Extension in New York City. In addition to regular meetings the club plans to publish a monthly newsletter. For additional information you may call 357-5580 between 10 a.m. and 2 p.m. or Harold Laroff at (914) 425-2274 in the evenings. The clubs mailing address is P.O. Box 131, 10952.

Harold L. Laroff Monsey, NY

Editor:

To anyone interested in forming a Color Computer club in Suffolk County Long Island please give me a call at (516) 475-3957 or drop me a line at P.O. Box 485, 11772

I would also be grateful to those of you that run a Color Computer club, or belong to one, if you would send me some advise or ground rules for a club to get started.

William C. Mulvey Patchogue, NY

Editor:

I am pleased to announce the beginning of the CoCo Clan. Its newsletter is packed with programs, game and programming hints, game reviews and contests. Also, there are special discounts on programs we are selling. The club is run by teenage computer whizzes who are anxious to show their programming skills. Anyone interested in joining should write to 56 Willowwood Lane, 10308.

John Davis Staten Island, NY

Editor:

The San Antonio Color Computer Club offers membership to the club for \$25 per year. We offer a newsletter, contests and awards, low cost disks and drives, discounts on software and hardware items, plus more. For information write to 2430 Rawhide Lane, 78227.

James Leatherman San Antonio, TX Editor:

This is to announce the formation of The Skyline Color Computer Club of Berks County. We hold meetings on the third Friday each month. We teach BASIC programming and have software and hardware demonstrations. We also have classes on graphics and telecommunications. Interested users may call Louie Brubaker at (215) 921-3616 after 6 p.m. for more information.

John K. Weidman Hamburg, PA

Editor:

Would you inform your readers of a free CoCo club. It has no meetings. To find out what it's about send an SASE to 217 Graves Road, 37379.

Computer Master Soddy Daisy, TN

Editor:

I would like to announce the emergence of another CoCo club in the southeast Wisconsin area. Johnson Laboratories, Inc. is a new users group for anyone who would like to join. You can call (414) 639-1028 or write to me at 4132 North Greenbay Road, 53404.

Shawn A. Johnson Racine, WI

Editor:

The Ottawa 6809 Users Group is a non-profit club devoted to the Color Computer and other 6809-based computer systems. We have meetings on the third Monday of each month in which we discuss and demonstrate new products available for the CoCo and answer questions and problems from the members. For information contact me at (613) 225-3122 or Norm Shoihet at (613) 741-1763.

In addition, there is an OS-9 users group in Ottawa which meets on the second Tuesday of each month. Inquiries may be addressed to 3 Woolmsley Cres., Canada K2G 113.

David Buck Nepean, Ontario Editor:

The Winnipeg Micro-80 Users Group meets alternate Saturdays at 9:15 a.m. in Room 205, Technical Vocational High School, 1500 Wall Street. We feature a speaker at every meeting and give courses in BASIC and assembler. Phone Murray Day at 257-3537 or write to me at 108 Kingsway Ave., Canada R3M 0G9.

Mrs. C.C. Blunderfield Winnipeg, Manitoba

Editor:

There is now another Australian CoCo club in existence. The Hills District C.C.C. meets every fortnight for three hours and is devoted to our CoCos. We are looking for clubs to correspond with from any part of the world. Correspondents can write to the following address.

Andrew Rankin Hills District C.C.C. 42 Lucas Road, Seven Hills N.S.W., Australia 2147

Editor:

We are here! The 6809 Color Club. We are up to 200 members. We like the topics that have been published in THE RAINBOW magazine. RAINBOW is by far the best CoCo magazine in our country. Interested persons can write to me at the following address.

Francisco R. Maia Sobral Real Grandeza, 219, Bloco C, sala 1102 Rio de Janeiro, Brazil CEP 22283

Editor:

I proudly announce the Color Computer Users Group in Antwerp (Belgium). The group cooperates intensively with six other independent groups in Belgium and in the Netherlands. Together we have almost 1,000 members. We are interested in any kind of application or program for the Color Computer. If you are interested please write me at the following address:

Jorgen te Giffel Eikenlaan 1 4641 GB Ossendrecht the Netherlands 01131-1647-2214

(A)

One-Liner Contest Winner . . .

This One-Liner shows a missile flying to its target and detonating.

The listing:

Ø PMODE4:PCLS:SCREEN1:X=128:Y=19
Ø:CIRCLE(X,Y),15Ø,,.25:PAINT(X,Y),1:FORA=.6TO1STEP.Ø2:CIRCLE(X,Y),1ØØ,Ø,1,A-.Ø2,A:CIRCLE(X,Y),1ØØ,,1,A,A+.Ø2:NEXT:LINE(22Ø,Y)-(226,14Ø),PSET,BF:FORA=1TO1Ø:CIRCLE(223,14Ø),A,..5:NEXT:FORA=ØTO1:A=Ø:B=1-B:SCREEN1,B:NEXT

Eric Ball Calgary, Alberta

(For this winning one-liner contest entry, the author has been sent copies of both *The Rainbow Book Of Simulations* and its companion *Rainbow Simulations Tape*.)

One-Liner Contest Winner . . .

This One-Liner is hard to describe without giving it all away. Try it and see why!

The listing:

2Ø PMODE3,1:SCREEN1,Ø:PCLS3:X=82 :Y=154:FORR=1T04:CIRCLE(X,Y),16Ø +(2Ø*R),2,.6,.4,1:NEXT:FORM=4T06 :PAINT(Y,(M*8)-3),M,2:NEXT:CIRCL E(X,Y),24Ø,4,.6:CIRCLE(X,Y),22Ø, 1,.6:COLOR3,2:DRAW"BMØ,Ø;D191R25 5U191":FORX=ØTO99999:NEXT

> Barbara Paquin Weymouth, MA

(For this winning one-liner entry, the author has been sent copies of *The Rainbow Book Of Simulations* and its companion *Rainbow Simulations Tape.*)

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Ε.	7				-	
		8000	9	10	1.1	12
13	14	15	16	1.7	18	19
2.0	21	22	2.9	2.4	25	26
-	23	23	30	31	1	1

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Using association to learn the parts of the heart

A LESSON STRAIGHT FROM THE HEART

By Denis Santerre

The CoCo is a wonderful machine for learning. It is an asset when association is helpful. In the September 1984 issue of THE RAINBOW, Joseph S. Paravati showed us how association can be used to learn the states and capitals ("GeoGraphics." Page 177). From his program I got my character data, which he had gotten from TRS-80 News, April 1982, by R. Van Dyke.

Heart Quiz is a program that uses association to learn the parts of the heart. Before you load the program, type POKE 23040,0: POKE 25,90 and ENTER, then type NEW and ENTER. This will clear the memory for 12 pages of graphics instead of the usual eight. If you do the poke after you load in the program, it will be gone, so be sure to save it as soon as it is typed in.

When you run the program the computer will draw the heart in two locations in memory. These two drawings are a little different: one is the outside of the heart and the other is the inside chambers. For each part, the program will select one of these two drawings; it then will copy the selected drawing. To this drawing it will add the needed graphics for the part that is to be identified. By switching pages back and forth, this added graphics will give a flashing image until a key is hit.

(Denis Santerre is a biomedical equipment technician at Eastern Maine Medical Center. He is a self-taught computer hobbyist.)















As an aid to the clues, the length of words is given with dashes. Spaces, numbers and unrelated keys will be ignored. The back-arrow key will clear all you have typed in and let you change your answer. If the answer is wrong, the correct answer will be given. Your score will be shown as a percentage of correct answers to the total answers. A new part of the heart is selected and the routine is repeated.

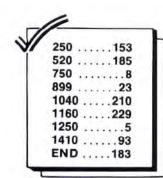
The heart is only one of the many subjects that can be learned with this type of program. To select your own drawings and words, simply replace the ones in *Heart Quiz* with your own. To make the drawing easier, a temporary routine at the end of the program will help. This will let you find line lengths, DRAW statements and circle sizes.

I have included such a program. Type in Listing 2 at the end of the program into which you want to put DRAW statements. From the menu, select the function you want: CIRCLE, LINE, BOX or DRAW. The joysticks and keyboard are used to control the size and shape of the added feature; typing × and

pressing ENTER will give the statement needed for the added feature.

You can use the space I left to put each new graphics line as it comes up (see remark lines). If you prefer, you can put your lines anywhere as long as you put RETURN at the end of your last line and change the GOSUB line number on Line 540.

(If you have any questions about *Heart Quiz*, you may contact Denis at Rt. 1, Box 511, E. Holden, ME 04429, phone 207-947-3711. If you write, please include an SASE.)



Listing 1: HEART

TER> NEW <ENTER> BEFORE YOU LOAD THIS PROGRAM. 1Ø CLS:PRINT@1Ø7, "THE HEART":PRI NT@196, "AN EDUCATION PROGRAM BY" : PRINT" denis santerre" 2Ø DIMN\$(3Ø),X\$(46),Y\$(46):GOSUB 13ØØ:GOSUB 12ØØ:PMODE4,1:CLS:PRI NT"THESE ARE THE WRONG ANSWERS": SCREEN1, Ø: COLORØ, 1: PCLS 99 '******DRAWS THE MAIN SCREE NS**** 1ØØ CIRCLE(98,86),7Ø,,1.4,Ø,.42 11Ø CIRCLE(45,1ØØ),35,,1.2,.27,. 92 12Ø CIRCLE(128,85),4Ø,,1,.73 13Ø CIRCLE(98,4Ø),2Ø,,1,.4Ø,.85 14Ø CIRCLE(98,43),4Ø,,1,.4Ø,.88 15Ø LINE(4,4Ø)-(4,165), PSET 16Ø LINE(3Ø,138)-(3Ø,165), PSET 17Ø LINE(3Ø,62)-(3Ø,4Ø),PSET 18Ø CIRCLE(17,39),13,,.3

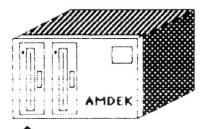
ø '***POKE 23Ø4Ø,Ø:POKE25,9Ø <EN

```
21Ø CIRCLE(165,65),2Ø,,1,.6,.8
22Ø CIRCLE(175,8Ø),12,,1,.6,.8
23Ø CIRCLE(175,8Ø),2Ø,,1,.65,.8
24Ø LINE(169,46)-(169,54), PSET
25Ø LINE(179,7Ø)-(179,6Ø),PSET
26Ø FORA=1TO4:PCOPYA TOA +8:NEXT
:PMODE4,9:COLORØ,1:CIRCLE(88,84)
,15,,.3:LINE(8Ø,52)-(125,45),PSE
27Ø CIRCLE(98,4Ø),2Ø,,1,.85,.Ø5
28Ø CIRCLE(98,43),4Ø,,1,.88,.Ø2
29Ø PMODE4,1:COLORØ,1
3ØØ CIRCLE(15Ø,86),5Ø,,1,.5,.8
31Ø CIRCLE(15Ø,86),76,,1,.49,.6
32Ø CIRCLE(15Ø,86),76,,1,.65,.79
33Ø LINE(1Ø3,28)-(82,28), PSET
34Ø LINE(87,44)-(8Ø,44), PSET
35Ø LINE(5Ø,28)-(61,28),PSET
36Ø LINE(5Ø,44)-(57,44),PSET
37Ø CIRCLE(5Ø,31),3,,2
38Ø CIRCLE(5Ø,41),3,,2
39Ø CIRCLE(165,25),7,,2
400 CIRCLE(88,84),13,,1,.5
41Ø CIRCLE(45,1ØØ),3Ø,,1.2,.2Ø,.
Ø7
42Ø CIRCLE(75,79),1Ø,,1,Ø,.25
43Ø CIRCLE(99,8Ø),1Ø,,1,.25,.5
44ø CIRCLE(1ØØ,9Ø),1Ø,,1,.9,.2Ø
45Ø CIRCLE(129,8Ø),1Ø,,1,.25,.5
46Ø CIRCLE(13Ø,9Ø),1Ø,,1,.75
47Ø CIRCLE(16Ø,9Ø),1Ø,,1,.5,.75
48Ø CIRCLE(62,138),1Ø,,1,.6,.9
49Ø CIRCLE(8Ø,116),1Ø,,1,.34,.6
5ØØ LINE(11Ø,17Ø)-(1Ø2,84),PSET
51Ø LINE(98,173)-(99,84),PSET
52Ø LINE(13Ø,8Ø)-(13Ø,9Ø),PSET
53Ø LINE(13Ø,8Ø)-(1Ø5,65),PSET
```

19Ø CIRCLE(17,164),13,,.3

200 CIRCLE(165,65),12,,1,.6,.8

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54Ø CIRCLE(98,86),63,,1.4,Ø,.42: PRESET (103,172) 55Ø CIRCLE(27,1ØØ), 7,,3.2 56Ø CIRCLE(128,85),34,,1,.68 599 '****DOES PART DRAWING**** 600 PMODE4,5 61Ø R=R+1:IFR>18THEN N=8 ELSEN=Ø 62Ø GOSUB89Ø 63Ø ON R GOSUB9ØØ,91Ø,92Ø,94Ø,95 Ø,96Ø,97Ø,98Ø,1ØØØ,1Ø1Ø,1Ø2Ø,1Ø3 Ø,1Ø4Ø,1Ø5Ø,1Ø6Ø,1Ø7Ø,1Ø9Ø,11ØØ, 1110,1120,1130,1140,1150,1170,11 8Ø,99Ø,119Ø 699 '***DOES THE QUIZZING**** $7\emptyset\emptyset$ A\$=N\$(R):B=1:PMODE4,5:COLORØ ,1:GOSUB88Ø 71Ø A=INSTR(A\$," "):IFA=ØTHENA\$($B) = A : GOTO73\emptyset$ 72 \emptyset A\$(B)=LEFT\$(A\$,A-1):A\$=RIGHT $(A$, LEN(A$) -A) : B=B+1:GOTO71\emptyset$ 73Ø FOR A=1TOB:DRAW "BM142,"+STR $(16\emptyset + (A*1\emptyset))$: FORC=1TOLEN(A(A)) :DRAW"BM+2,-3;R2;BM+3,+3":NEXTC: NEXT 74Ø D\$="":A=Ø:A\$=INKEY\$:C\$="" 75Ø A=A+1:D\$=D\$+A\$(A):DRAW "BM14 2,"+STR\$(156+A*1Ø) 76Ø IFC\$=""THENGOSUB86Ø

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77Ø A\$=INKEY\$:IF A\$=CHR\$(13)THEN 83Ø 78Ø IFA\$=CHR\$(8)THEN7ØØ 79Ø IF A\$=>"Ø"AND A\$<="Z"THEN GO SUB 1340:C\$=C\$+A\$ 8ØØ IF LEN(C\$)=LEN(D\$)THEN IFA<B THEN75ØELSE IF A=B THEN 83Ø 81Ø IF C\$=""THEN76Ø 82Ø GOTO77Ø 83Ø T=T+1:DRAW"BM18Ø,135":IF C\$= D\$THEN A\$="CORRECT":GOSUB1340:CO =CO+1:GOTO85Ø 84Ø PRINTN\$(R):SCREEN1,Ø:A\$="WRO NG":GOSUB134Ø:GOSUB88Ø:FORA=1TOB :DRAW"BM142,"+STR\$(A*1Ø+156):A\$= A\$(A):GOSUB134Ø:NEXTA:GOTO85Ø 85Ø A\$="SCORE ":DRAW"BM18Ø,15Ø": GOSUB134Ø:A\$=STR\$(INT(CO/T*1ØØ)) :GOSUB134Ø:FORA=1TO7ØØ:NEXTA:GOT 06ØØ 86Ø FOR C=1 TO 1ØØ:NEXT:PMODE4,N +1:SCREEN1,Ø 87Ø FOR C=1 TO 1ØØ:NEXT:PMODE4,5 :SCREEN1, Ø:COLORØ, 1:RETURN 88Ø LINE(254,19Ø)-(14Ø,158),PRES ET, BF: LINE-(254, 190), PSET, B: RETU 89Ø PMODE4,5:SCREEN1,Ø:COLORØ,1: FORA=1TO4:PCOPYA+N TOA+4:NEXT:RE TURN 899 '****STEPS TO DRAW PARTS** 9ØØ PAINT(55,4Ø),Ø:PAINT(15Ø,2Ø) ,Ø:RETURN 91Ø CIRCLE(87,87),1Ø:RETURN 92Ø PAINT(162,5Ø),Ø 93Ø PAINT(167,68),Ø:RETURN 94Ø LINE(14Ø,9Ø)-(15Ø,9Ø), PSET:P AINT(14Ø,7Ø),Ø:RETURN 95Ø LINE(14Ø,9Ø)-(15Ø,9Ø), PSET:L INE(110,90) - (120,86), PSET: PAINT(14Ø,11Ø),Ø:RETURN 96Ø LINE(85,8Ø)-(9Ø,8Ø), PSET:LIN E(75,125) - (7Ø,132), PSET: PAINT (9Ø ,13Ø),Ø:RETURN 97Ø LINE(75,125)-(7Ø,132), PSET:P AINT(5Ø,13Ø),Ø:RETURN 98Ø GOSUB 91Ø:GOTO1Ø4Ø 99Ø CIRCLE(85,165),1Ø,,1,Ø,.25:C IRCLE(125,16Ø),1Ø,,.7,.25,.5:LIN E(95,165)-(93,110), PSET: LINE-(11 5,16Ø), PSET: CIRCLE(88,11Ø),5,,1, .75,Ø:LINE(88,1Ø5)-(5Ø,11Ø),PSET : RETURN 1000 CIRCLE(145,90),10:RETURN 1Ø1Ø CIRCLE(7Ø,125),1Ø:RETURN 1Ø2Ø GOSUB1ØØØ:GOTO1Ø1Ø 1030 LINE(110,90) - (121,85), PSET:PAINT($8\emptyset$, $5\emptyset$), \emptyset : PAINT($11\emptyset$, 75), \emptyset : R ETURN

1Ø4Ø CIRCLE(117,9Ø),1Ø:RETURN 1Ø5Ø PAINT(16Ø,7Ø),Ø:RETURN 1Ø6Ø CIRCLE(98,84),63,,1.4,Ø,.42 : RETURN 1Ø7Ø CIRCLE(98,88),7Ø,,1.4,Ø,.42 ::A\$="NOT A SACK":DRAW"BM17Ø,1ØØ ":GOSUB134Ø:RETURN $1\emptyset 8\emptyset$ LINE $(2\emptyset, 1\emptyset\emptyset) - (4\emptyset, 1\emptyset\emptyset)$, PSET: CIRCLE(3Ø,5Ø),1:RETURN $1\emptyset9\emptyset$ LINE $(4,1\emptyset\emptyset)$ - $(9,1\emptyset\emptyset)$, PSET:PA $INT(2\emptyset, 5\emptyset), \emptyset: RETURN$ $11\emptyset\emptyset$ LINE $(4,1\emptyset\emptyset)$ - $(9,1\emptyset\emptyset)$, PSET:PA INT(2Ø,14Ø),Ø:RETURN 111Ø CIRCLE(4Ø,85),4:RETURN 112Ø CIRCLE(5Ø,1Ø5),4:RETURN 113Ø CIRCLE(98,95),6Ø,,1.2,.1,.4 :DRAW "BM11Ø,171;H6;E1Ø;BM+15,+5 ;H3;U5;BM+15,+1;H4;U4;BM8Ø,171;E 6;H1Ø;BM-15,+Ø;E3;U5;BM-12,+1;E5 ;U5":RETURN 114Ø CIRCLE(95,8Ø),5Ø,,1.5,.3,.4 :CIRCLE(9Ø,85),3Ø,,1.5,.25,.42:C IRCLE (7Ø, 11Ø), 3Ø,, 1.5,.25,.42:CI RCLE(3Ø,75),4Ø,,1.7,.99,.22:CIRC LE(34,72),4Ø,,1.7,.Ø2,.2:PAINT(7 Ø,9Ø),Ø:RETURN 115Ø LINE(83,52)-(167,77), PSET:L INE-(84,58), PSET: LINE-(83,52), PS ET: DRAW"BM82, 132; M+6, -2; BM+6, -2; M+6,-2;BM+5,-2;M+5,-2;BM+5,-1;M+5,-2;BM+5,-2;M+5,-5;BM+5,-5;M+5, -5; BM+5, -5; M+5, -5; BM+5, -5; M+5, -5 ;":PAINT(98,58), Ø:RETURN 116Ø CIRCLE(84,1Ø4),1Ø:RETURN 117Ø CIRCLE(98,88),7Ø,,1.4,Ø,.42 :A\$="THE SACK":DRAW"BM17Ø,1ØØ":G OSUB1340: RETURN 118Ø CIRCLE(1ØØ,84),2Ø,,1,.75,Ø: CIRCLE(1ØØ,84),23,,1,.75,Ø:LINE(123,84) - (115,15Ø), PSET: LINE-(12Ø ,84), PSET: LINE (100,61) - (85,61), P SET:LINE-(88,65), PSET:LINE-($1\emptyset\emptyset$, 65), PSET: PAINT(122,84), Ø: RETURN 119Ø PRINT"SCORE "INT(CO/T*1ØØ) 1199 '****LOADS WORDS TO ARRAY* 1200 RESTORE: READA\$: IF A\$<>"NAME S"THEN12ØØ 121Ø A=Ø 122Ø A=A+1:READA\$:IFA\$<>"END"THE NN(A) = A$: GOTO122\emptyset$ 123Ø RETURN 1240 DATA NAMES, PULMONARY ARTERY , PULMONARY VALVE, PULMONARY VEINS ,LEFT ATRIUM, LEFT VENTRICLE, RIGH T VENTRICLE 1250 DATA RIGHT ATRIUM, SEMILUNAR VALVES, MITRAL VALVE, TRICUSPID V ALVE, ATROVENTRICULAR VALVES, AORT

126Ø DATA AORTIC VALVE, MYOCARDIU M, ENDOCARDIUM, EPICARDIUM 127Ø DATA SUPERIOR VENA CAVA, INF ERIOR VENA CAVA, SA NODE, AV NODE, PURKINJE FIBERS, RIGHT CORONARY, C IRCUMFLEX ARTERY 1280 DATA PERICARDIUM, ANTERIOR I NTERVENTRICULAR BRANCH, BUNDLE OF HIS, END 1299 '**LOADS LETTER ARRAY*** 1300 RESTORE 131Ø READA\$:IF A\$<>"LETTERS"THEN 131ØELSEA=Ø 132Ø A=A+1:READA\$,B\$:IFA\$<>"END" THENX(A) = A: Y(A) = B\$: GOTO132 \emptyset 133Ø RETURN $134\emptyset$ FOR J=1 TO LEN(A\$) $135\emptyset X = (MID (A , J, 1))$ 136Ø IF X\$=>"-" AND X\$<="Z"THEND RAW Y\$ (ASC(X\$)-44) 137Ø IF X\$=" "THENDRAW"BM+7, Ø" 138Ø NEXT J:RETURN 139Ø DATA LETTERS, -, "BM+2, -3; R2; BM+3,+3",,"",,"",ø,"BM+1,ø;HlU4E lR2F1D4G1L2;BM+6,Ø",1,"BM+1,Ø;R1 NR1U6G1; BM+6,+5",2,"NR4U1E1R1E2U 1H1L2G1; BM+7, +5", 3, "BM+Ø, -1; F1R2

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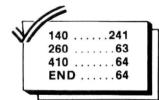
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E1H2E2H1L3; BM+7, 6" 1400 DATA 4, "BM+3,0; U2NR1L3U1E3D 3;BM+4,3",5,"BM+Ø,-1;F1R2E1U2H1L 3U2R4; BM+3,+6",6, "BM+4,-5; H1L2G1 D4F1R2E1U1H1L3; BM+7, +3", 7, "U1E4U 1L4; BM+7,+6",8,"BM+1,-Ø; H1U1E1H1 Uleir2FiDiGiNL2FiDiGiL2; BM+6, Ø" 141Ø DATA 9, "BM+Ø,-1; F1R2E1U4H1L 2GlDlFlR2;BM+4,+3",,"",,"",,"",, "",,"",,"",,"" 1420 DATA A, "U4E2F2D2NL4D2; BM+3, Ø",B,"U6R3F1D1G1NL3F1D1G1L3;BM+7 ,øii 143Ø DATA C, "BM+1, -Ø; H1U4E1R2F1; BM+Ø,+4;G1L2;BM+6,Ø",D,"U6R3F1D4 G1L3; BM+7, Ø", E, "NR4U3NR2U3R4; BM+ 3,+6" 144Ø DATA F, "U3NR2U3R4; BM+3,+6", $G,"BM+1,-\emptyset;HlU4ElR2Fl;BM+\emptyset,+2;NL$ 1D2G1L2;BM+6,Ø",H,"U3NU3R4NU3D3; BM+3,0",I,"BM+1,0;RINR1U6NL1R1;B M+4,+6" 145Ø DATA J, "BM+Ø, -1; F1R1E1U5NL1 R1; BM+3, 6", K, "U3NU3R1NE3F3; BM+3, Ø",L,"NU6R4U1;BM+3,+1",M,"U6F2ND 1E2D6; BM+3, Ø" 146Ø DATA N, "U6F1D1F2D1F1NU6; BM+ 3, Ø", O, "BM+1, Ø; H1U4E1R2F1D4G1L2; BM+6, \emptyset ", P, "U6R3F1D1G1L3; BM+7, 3" 147Ø DATA Q, "BM+1, Ø; H1U4E1R2F1D3 GINHINFIGIL1; BM+6, \emptyset ", R, "U6R3F1D1 G1L2NL1F3; BM+3, \emptyset ", S, "BM+ \emptyset , -1; F1R 2E1U1H1L2H1U1E1R2F1;BM+3,+5" 148Ø DATA T, "BM+2, +Ø; U6NL2R2; BM+ 3,+6",U,"BM+Ø,-1;NU5F1R2E1U5;BM+ 3,6",V,"BM+Ø,-6;D2F1D1F1ND1E1U1E 1U2; BM+3,+6" 149Ø DATA W, "NU6E2NU1F2U6; BM+3,6 "U1E4U1;BM-4,Ø;D1F4D1;BM+3,Ø ",Y,"BM+Ø,-6;D2F2ND2E2U2;BM+3,6" ,Z,"NR4U1E4U1L4;BM+7,6" 1500 DATA END, END



Listing 2: HELPDRAW

1Ø PMODE4,1
2Ø CLEAR1ØØØ
3Ø SCREEN1,1:GOSUB 54Ø'the graph
ics will begin at this gosub # e
ven if you do a renum.
4Ø CLS:PRINT"THIS PROGRAM WILL H
ELP YOU FIND GRAPHIC STATEMENTS.
":PRINT"SEE THE REMARKS LINES.":

PRINT"by denis santerre ":PRINT" 1) CIRCLE":PRINT"2) LINE":PRINT" 3) BOX":PRINT"4) DRAW":INPUTI 5Ø ON I GOTO6Ø,17Ø,17Ø,28Ø 6Ø CLS:PRINT"USE THESE:":PRINT"E XIT":PRINT"SCREEN":PRINT"UP AND DOWN ARROWS CHANGES STARTOF ARC" :PRINT"LEFT AND RIGHT ARROWS CHA FINISH OF ARC": PRINT"USE BOTH JOYSICKS":LINEINPUTZ\$ 7Ø SCREEN1,1 8Ø GOSUB18Ø:CIRCLE(V,H),V1,,H1/V 1,S,F 9Ø GOSUB27Ø:IF I\$=CHR\$(94)THEN I F F<.99THEN S1=S+. \emptyset 5 ELSE S1= \emptyset 100 IF I\$=CHR\$(10)THEN IFS<.05 T HENS1=1ELSES1=S-.Ø1 11Ø IF I\$=CHR\$(8)THEN IF F<.99TH ENF1=F+.Ø5 ELSE F1=Ø 12Ø IF I\$=CHR\$(9)THEN IFF<.Ø5 TH ENF1=1 ELSEF1=F1-.Ø1 13Ø IF I\$=">"THEN SS=SS+.Ø1 ELSE IFI\$="<"THENSS=SS-.Ø1 14Ø IF I\$="X"THENCLS: PRINT"CIRC LE("INT(V)", "INT(H)"), "INT(V1)", ,"INT(H1*1ØØ/V1)/1ØØ","S","F:GOT 053Ø 15Ø CIRCLE(V,H),V1,Ø,H1/V1,S,F:S =S1:F=F1 16Ø GOTO8Ø 17Ø CLS:INPUT"USE YOUR JOYSTICKS EXIT, SCREEN CLEAR"; Z\$: SCREEN1, 1:ONI-1GOTO19Ø,23Ø 18Ø GOSUB26Ø:V1=V1*254/63+1:H1=H 1*19Ø/63+1:RETURN 19Ø GOSUB 18Ø:LINE(V,H)-(V1,H1), PSET 200 GOSUB 270:IF I\$="X"THEN CLS: PRINT"LINE("INT(V)","INT(H)")-(" INT(V1)","INT(H1)"), PSET":GOTO53 21Ø LINE(V,H)-(V1,H1), PRESET 22Ø GOTO19Ø 23Ø GOSUB 18Ø:LINE(V,H)-(V1,H1), PSET, B 24Ø GOSUB 27Ø:IF I\$="X"THEN CLS: PRINT"LINE("INT(V)", "INT(H)")-(" INT(V1)","INT(H1)"), PSET, B":GOTO 53Ø 25Ø LINE(V,H)-(V1,H1),PRESET,B:G OTO23Ø 26Ø V=JOYSTK(Ø)*25Ø/64:H=JOYSTK(1) \star 19 \emptyset /63:V1=JOYSTK(2):H1=JOYSTK (3):RETURN 27Ø I\$=INKEY\$:IF I\$="S"THENGOTO5 4ØELSERETURN 28Ø CLS:PRINT"THESE ARE YOUR COM MANDS YOU WILLHAVE TO REMEMBER." :PRINT"uP, dOWN, lEFT, rIGHT, mo

VE, no UPDATE bLANK MOVE":PRINT" e,h,g,f-FOR 45,135,225,315 DEGREES": PRINT"OK, CANCEL, EXIT, instructions": PRINT"screen UPDA TE" 290 PRINT"THE LEFT AND RIGHT ARR OWS WILL CHANGE DISTANCE" 300 PRINT"USE YOUR RIGHT JOYSTIC <ENTER> FOR MOVE" K AND 31Ø INPUT"PRESS ENTER TO CONTINU E" ; IS 32Ø IFA\$=""THENA\$="BM127,95" 33Ø SCREEN1.1 34Ø GOSUB 27Ø 35Ø DRAWAS 36Ø IFLEN(A\$)>24Ø THENGOTO52Ø 37Ø IF I\$=""THENGOTO34Ø 38Ø IF I\$="N"THEN N\$="N":GOTO34Ø 39Ø IF I\$="B"THENN\$="B":I\$="M" 400 ON INSTR("MUDLREFGHXI", I\$)+1 GOTO 34Ø,44Ø,45Ø,45Ø,45Ø,45Ø,45 Ø,45Ø,45Ø,45Ø,52Ø,28Ø 41Ø SCREEN1,1:DRAW A\$+B\$ 42Ø K\$=INKEY\$:IFK\$=""THEN42Ø ELS E IFKS="O"THENAS=AS+NS+BS:NS="": GOTO34ØELSE DRAW"CØ"+A\$+B\$:DRAW" Cl"+A\$:IFK\$="C"THENN\$="":GOTO34Ø :ELSE GOTO4ØØ 43Ø RETURN 44Ø GOSUB 46Ø:GOTO41Ø 45Ø GOSUB 47Ø:GOTO41Ø 46Ø GOSUB26Ø:X\$=STR\$(INT(V)):Y\$= STR\$(INT(H)):B\$=I\$+X\$+","+Y\$:RET URN 47Ø GOSUB49Ø:X\$=STR\$(D) 48Ø BS=IS+XS:RETURN 49Ø IF K\$=CHR\$(9)THEND=D+5ELSE I FK\$=CHR\$(8)THEND=D-1 500 IF D<1THEND=1ELSEIF D>254THE ND=254 51Ø RETURN 52Ø CLS:PRINTA\$ 53Ø PRINT".... IS THE GRAPHIC S TO ADD TO YOU PROGRAM. TATEMENT ":PRINT"YOU MAY OMIT SPACES.":EN 540 PCLS:SCREEN1,1'***THIS AREA IS FOR ROUTINES AS YOU WRITE THE M****** 1000 RETURN 0



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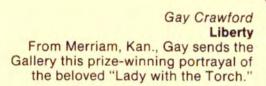
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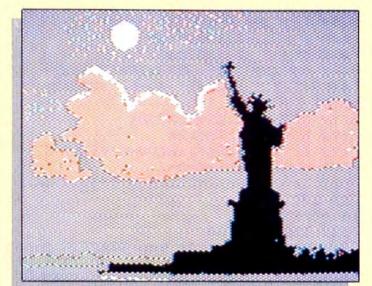


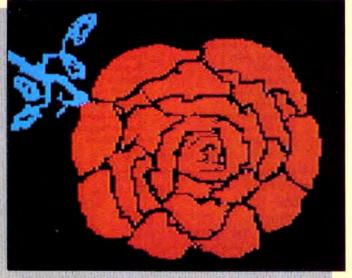
Andrea C. Bain Hummingbird This special expanded edition of the CoCo Gallery presents Andrea Bain's

Andre 9

This special expanded edition of the CoCo Gallery presents Andrea Bain's first prize portrait of one of nature's smallest wonders. Andrea lives in San Diego, Calif.

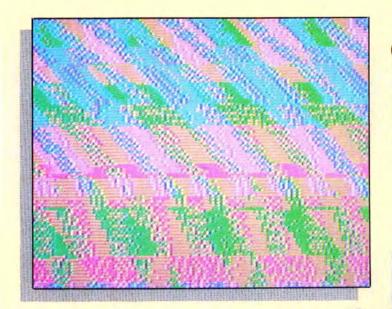






James C. Graves, Jr.
Rose
Poets have long waxe

Poets have long waxed lyrical over the rose, but James shows us once again why pictures are worth a thousand words. James lives in Sierra Vista, Ariz.

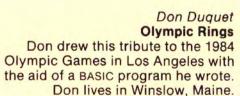


HONORA

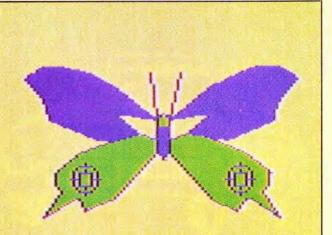
Michael E. Murray

Abstract

Michael lives in Venice, Calif., and sends us this graphics image produced from his own program for converting sound into digital data.



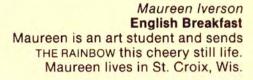




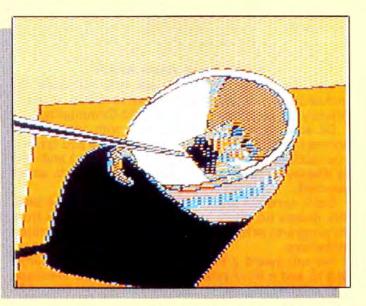


Merwyn Bly Butterfly

From Vienna, Va., Merwyn gives the Gallery a butterfly drawn using BASIC LINE commands, which produce the curves we see in the upper wings.

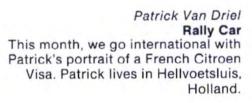






Nicolas Cote **Grand Prix** Nicolas lives in Alma, Quebec, and gives the Gallery another international racer's delight.







SHOWCASE YOUR BEST!

You are invited to nominate original work for inclusion in upcoming showings of CoCo Gallery. Share your creations with the CoCo Community!

Be sure to send a cover letter with your name, address and phone number detailing how you created your picture (what programs you used, etc.) and how to display it. Also, please include a few facts about vourself.

Don't send us anything owned by someone else; this means no game screens, digitized images from TV programs or material that's already been submitted elsewhere.

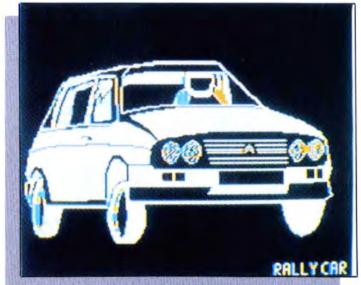
We will award a first prize of \$25, a second prize of \$15 and a third prize of \$10. Honorable mentions also will be given.



Steven Baker

Flood

Steven really gripped us with this dramatic depiction of a benighted house during a flood. Steven lives in Hattiesburg, Miss.



Send your entry on either tape or disk

CoCo Gallery THE RAINBOW P.O. Box 385

Prospect, KY 40059 Attn: Monica Dorth

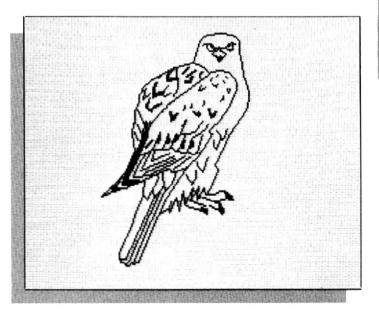


Ray Larabie

Street Scene

Ray lives in White Lake, Ontario, and offers this impressive display of perspectives in a contemporary setting.





Clay Howe

USAF Thunderbirds

Clay lives in Sturgis, Mich., and has captured the "right stuff" of the Thunderbirds' straight up, diamond formation.

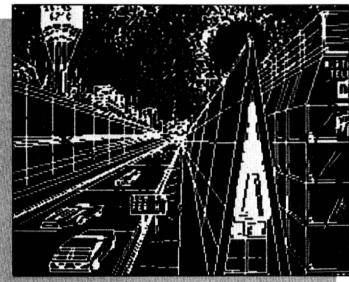
HONORABLE

HONORAB

Brian S. Thorn

U.S.S. Enterprise

Brian has created a stirring illustration of The Federation's most famous ship approaching Earth. Brian lives on Patrick Air Force Base, Fla.

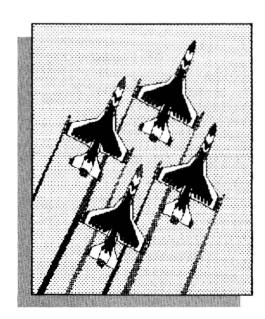


HONORA

Michael Keefe

Gyrfalco

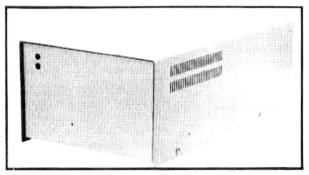
From Philadelphia, Pa., Michael has submitted a portrait of a gyrfalcon, a strong and fierce predator of great dignity.



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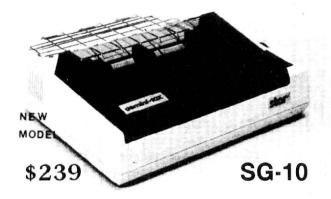
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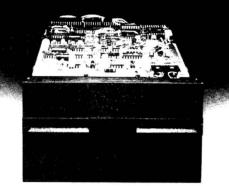
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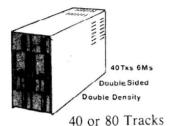
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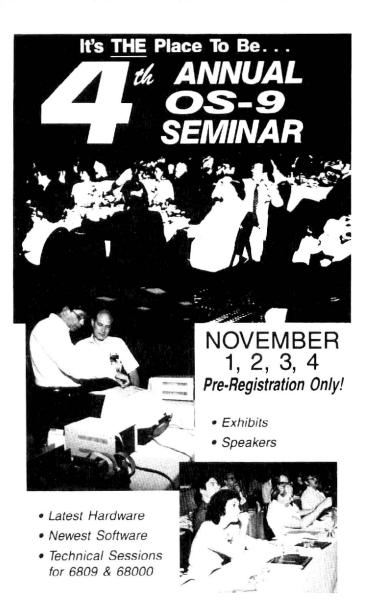
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Important Message

By Bill Bernico

16K ECB

1Ø CLS:FORX=96T0448STEP96:PRINT@
X,STRING\$(32,45);:NEXTX:FORY=4T0
484STEP32:PRINT@Y,CHR\$(33);:NEXT
Y:FORZ=8T0488STEP32:PRINT@Z,CHR\$
(33);:NEXTZ:FORC=12T0492STEP32:P
RINT@C,CHR\$(33);:NEXTC:FORV=16T0
496STEP32:PRINT@V,CHR\$(33);:NEXT
V

2Ø FORB=2ØTO5ØØSTEP32:PRINT@B,CH R\$(33);:NEXTB:FORN=24TO5Ø4STEP32 :PRINT@N,CHR\$(33);:NEXTN:FORM=28 TO5Ø8STEP32:PRINT@M,CHR\$(33);:NE XTM:FORF=96TO384STEP96:PRINT@F," ";:NEXTF

3Ø POKE1Ø58,15:POKE1Ø9Ø,3:POKE11 22,2Ø:POKE1154,15:POKE1186,2:POK E1218,5:POKE125Ø,18:POKE1314,113 :POKE1346,121:POKE1378,12Ø:POKE1 41Ø,117

4Ø POKE1Ø37,113:POKE1Ø41,114:POK E1Ø45,115:POKE1Ø49,116:POKE1Ø53, 117:POKE1157,118:POKE1161,119:PO KE1165,12Ø:POKE1169,121:POKE1173, 113:POKE1174,112:POKE1177,113:P OKE1178,113:POKE1181,113:POKE118 2,114:POKE1253,113:POKE1254,115: POKE1257,113:POKE1258,116

5Ø POKE1261,113:POKE1262,117:POK E1265,113:POKE1266,118:POKE1269, 113:POKE127Ø,119:POKE1273,113:PO KE1274,12Ø:POKE1277,113:POKE1278, 121:POKE1349,114:POKE135Ø,112:P OKE1353,114:POKE1354,113:POKE135 7,114:POKE1358,114:POKE1361,114: POKE1362,115

6Ø POKE1365,114:POKE1366,116:POK E1369,114:POKE137Ø,117:POKE1373, 114:POKE1374,118:POKE1445,114:PO KE1446,119:POKE1449,114:POKE145Ø, 12Ø:POKE1453,114:POKE1454,121:P OKE1457,115:POKE1458,112:POKE146 1,115:POKE1462,113

7Ø POKE15Ø9,18:POKE151Ø,1:POKE15 11,9:POKE1512,14:POKE1513,2:POKE 1514,15:POKE1515,23:POKE1516,6:P OKE1517,5:POKE1518,19:POKE1519,2 Ø:POKE1521,16:POKE1522,18:POKE15 23,9:POKE1524,14:POKE1525,3:POKE 1526,5:POKE1527,2Ø:POKE1528,15:P OKE1529,14

8Ø FORU=1T01ØØØ:POKE1177,49:POKE 1178,49:POKE1181,49:POKE1182,5Ø: POKE1253,49:POKE1254,51:FORX=1T0 6ØØ:NEXTX:POKE1177,113:POKE1178, 113:POKE1181,113:POKE1182,114:PO KE1253,113:POKE1254,115:FORB=1T0 6ØØ:NEXTB,U

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If you have a 'Real Talker', do not deprive yourself of this absolutely incredible machine-language Talking Head simulation program. While other talking head simulations use a minimal cartoonlike face, TALKHEAD uses high resolution, fullscreen, digitized images of an actual person's face to create a life-like animated effect.



SOFTWARE FOR THE 'REAL TALKER'

TALKHEAD can be easily commanded in Basic to appear on screen and say anything you want. Available on cassette or disk for only \$19.95, TALKHEAD requires 64K and a Colorware 'Real

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This is one of those rare programs that will captivate everyone in your family....
No one can see CoCo Max and not want to try it!



We are all witnessing an exciting revolution in microcomputers: a radically new kind of computer and software that opens a whole new world of creative power to computer users.

It was inevitable that this exciting approach would be brought to the CoCo. With this in mind, Colorware chose to go all out and maximize this new concept for the color computer. That meant designing not just software but hardware too. It meant thousands of hours of pure machine language programming. Rarely has this much effort been applied to one product for the Color Computer.





UNMATCHED CAPABILITY...

Because we took the maximum approach: highly optimized machine code combined with hardware, CoCo Max truly stands above the rest as the ultimate creative tool for the Color Computer. It's unrivaled performance lets you create with more brilliance and more speed than any similar system — much more than you ever imagined possible. And, you can do it in black & white or color.



All the sophisticated power of the bigger systems is there: *Icons, Pull-Down Menus,* full *Graphic Editing, Font Styles,* and all kinds of handy tools and shortcuts.

Plug your joystick, mouse or touch pad into CoCo Max's Hi-Res Input Unit. Then use a delightfully simple *Point-and-Click* method to get any of CoCo Max's powerful graphic tools. It has them all:

You can Brush, Spray or Fill with any Color, Shading or Pattern. Use Rubber Band Lines and Shapes (square, rectangle, circle, elipse, etc.) to create perfect illustriations with speed and ease. There's a Pencil, an Eraser and even a selection of Caligraphy Brushes. And, as you can see. CoCo Max can do a lot with text. All of the newest special effects are there: Trace Edges, Flip, Invert, Brush Mirrors, etc. And all of the very latest supercapabilities like: Undo, which automatically reverses your mistakes, and Fat Bits which zooms you way in on any part of your subject to allow dot-for-dot precision.



THE BIG PICTURE

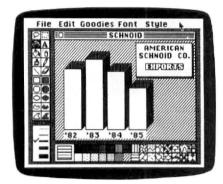
The large image box in the middle of the CoCo Max screen is actually only a window on an even larger image. Use the Point-and Click "Hand" to effortlessly move your window over any portion of the larger image. You have a working area of up to 3-½ times the area of the window itself.

FLEXIBLE PRINTING...

CoCo Max gives you many ways to print. Fill a whole page with your image or condense two full CoCo screens to less than ¼ page for a finely detailed copy. "Dump" your CoCo Max screen full size or shrink it to ¼ page size.

FREEDOM TO CREATE...

Anyone who wants to create anything at all on their CoCo screen or printer will certainly be very glad to meet CoCo Max. CoCo Max's triendly yet sophisticated graphic and text capabilities let you almost instantly produce illustrations, diagrams, charts,



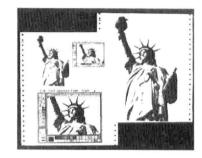
graphs, and computer art – for serious use or just for creative fun.



tion by using software schemes such as sliding windows. Although clever, these schemes yield sluggish and awkward results. Only CoCo Max does it the right way. The CoCo Max Hi-Res Input Unit plugs into your ROM slot and adds an entirely new joystick input to your computer — a precision one with a 49,152 point resolution to match the CoCo screen exactly.

Plug your same joystick, mouse or touch

You may then use CoCo Max's graphic magic on it. The DS-69 is available as an option from Colorware from \$149.95 complete with its own software on disk or tape. Using the DS-69 with a disk requires an RS multi-pak adaptor.



COCO MAX REQUIREMENTS

The CoCo Max System includes the Hi-Res Input Unit, software on disk or cassette (please specify) and user manual. It will work on any 64K Extended or non-

THE COCO MAX SYSTEM

AN ABSOLUTE GUARANTEE

CoCo Max is a hardware/software system that no software-only system can match. Get CoCo Max and see your CoCo perform as it never could before. If you don't agree that CoCo Max is the ultimate creative tool for the Color Computer, simply return it within 20 days for a full, courteous refund from Colorware.

THE HARDWARE...

This is the key to CoCo Max's unmatched performance. Did you know the normal joystick input built into the Color Computer only allows access to 4,096 (64 x 64) points on the CoCo screen? Yet, the Color Computer's high resolution screen



has 49,152 (256 x 192) pixels. This means that a joystick, mouse or even a touch pad can, at best, only access about one tenth of the pixels on the CoCo screen.

Most graphic programs ignore this hardware limitation of the Color Computer and give you only low-res control. Others attempt to overcome the limitapad into this new input and you have a whole new kind of control. The difference is remarkable.



A DIGITIZER OPTION...

We studied all the video digitizers available and picked the best of them to link with CoCo Max. The DS-69 from Micro Works was our choice. This optional device lets you capture the image from any video source (video recorder, camera, etc.) on your Color Computer.



extended Color Computer, You'll need a Radio Shack or equivalent joystick, mouse or touch pad. Disk systems require a Multi-Slot Interface or Y-Branching Cable.

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NUMBER

For a challenge of your wits, try this mental stumper

n arcade game calling more for mental than physical reaction, Number Bumper works in Color BASIC and — with the change noted in Line 150 — on the MC-10.

I've corresponded with hundreds of Color Computer owners, and while we all share one interest — the CoCo — we are a community of differing physical abilities. I know of a recovering stroke victim who uses two fingers of the same hand to type the BASIC listings found in THE RAINBOW. And there are users with degrees of impaired movement or paralysis caused by a range of circumstances.

Number Bumper is a game that such users can play. It is not meant to condescend to anyone's physical disability, but rather to equalize play among the range of our CoCo family by making the gist of the game a mental decision triggered by the tap of any key. I think Number Bumper will be challenging to all who enjoy recreations calling for nimble wits.

(Richard Ramella is a former newspaper editor who now works as a writer for a California hospital. He has published more than 200 Color Computer programs.) To start the game, type RUN and press ENTER. Orange bars are drawn at top and bottom of the screen, with the word "SCORE:" at the bottom. Tap any key to start the game. As play begins, a number ranging from zero to nine scoots across the top of the bottom orange bar. Pressing any key shoots it to the top of the screen. It rests where it hits.

If a number is allowed to scoot all the way across the screen, 10 points are deducted. Points are scored by shooting a number up to rest against a higher number. For example, a '9' has stuck against the top bar; a '1' comes scooting across. A key tap sends the '1' upward to stick against the '9'. Since 9 - 1 = 8, the turn is worth eight points. There is no score if the top number is lower than the number that hits it.

The game ends if two of the same number end up touching, either side by side or top to bottom. This produces a razzing sound, after which another game may be started by tapping any key twice.

(For those having any questions about this program, Mr. Ramella can be contacted at 1493 Mt. View Avenue, Chico, CA 95926. Please include an SASE.)

By Richard Ramella



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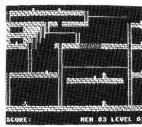
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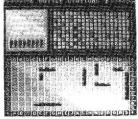
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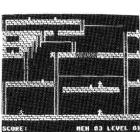
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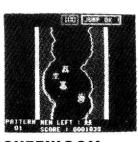
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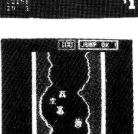


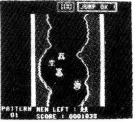












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are hidden trap doors, burly guards,

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the computer.

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300239 END12

100 REM * NUMBER BUMPER * TRS-80 COLOR BASIC 16K

11Ø REM * BY RICHARD RAMELLA

12Ø CLSØ: FOR X=1 TO 18: Q\$=Q\$+C

HR\$(128): NEXT

13Ø Z\$=CHR\$(255): FOR X=1 TO 5:

Z\$=Z\$+Z\$: NEXT

14Ø S\$="Ø123456789"

15Ø PK=1Ø24: REM * MC-1Ø MAKE TH

IS PK=16384

16Ø PRINT Z\$;

17Ø PRINT @ 448,Z\$;

18Ø PRINT @ 488, "SCORE:";

19Ø PRINT @ 232,"TAP A KEY TO ST ART";

200 IF INKEY\$="" THEN Z=RND(0): GOTO 2ØØ

21Ø PRINT @ 232,Q\$;

22Ø N\$=MID\$(S\$,RND(1Ø),1)

23Ø X=RND(2)

24Ø IF X=1 THEN FOR L=447 TO 416 STEP -1

25Ø IF X=2 THEN FOR L=416 TO 447

26Ø PRINT @ L,N\$;

27Ø FOR T=1 TO 4Ø: NEXT T

28Ø PRINT @ L,CHR\$(128);

29Ø A\$=INKEY\$: IF A\$<>""THEN 35Ø

300 NEXT L: FOR X=1 TO 10

31Ø SOUND RND(13) *RND(13),1

32Ø NEXT X: SC=SC-1Ø

33Ø PRINT @ 494,SC;" ";

34Ø GOTO 22Ø

35Ø FOR L=L TO L-384 STEP -32

360 PRINT @ L,N\$;

 $37\emptyset$ L1=PEEK(PK+L-1)

38Ø R1=PEEK(PK+L+1)

39Ø U1=PEEK(PK+L-32)

4ØØ IF U1<>128 THEN 43Ø

41Ø PRINT @ L,CHR\$(128);

42Ø NEXT L: GOTO 22Ø

43Ø P=PEEK(PK+L)

44Ø IF Ll=P OR Rl=P OR Ul=P THEN 48Ø

45Ø S1=U1-P: IF S1<Ø OR U1=255 T

HEN 22Ø

46Ø SC=SC+S1

47Ø PRINT @ 494,SC;: GOTO 22Ø

48Ø PRINT @ 14,"END";

49Ø FOR T=1 TO 3Ø

500 SOUND 100,1: NEXT

51Ø PRINT @ 448,"";

52Ø Z\$=INKEY\$: IF Z\$="" THEN 52Ø

53Ø GOTO 12Ø

54Ø END



64K EXT. BASIC 13495

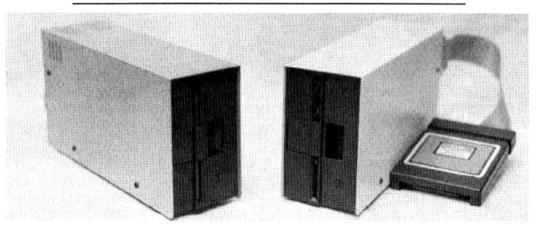
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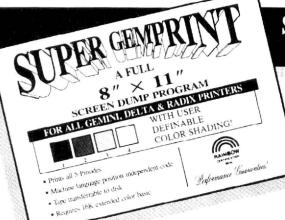
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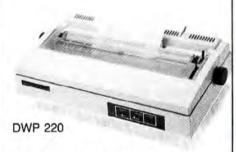
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RECEIVED & CERTIFIED

The following products recently have been received by THE RAINBOW, examined by our magazine staff and approved for the *Rainbow Seal of Certification*, your assurance that we have seen the product and have ascertained that it is what it purports to be.

This month the Seal of Certification has been issued to:

No-Stat II, an 11- by 15-inch antistatic pad to rest CoCo on, protect it from static electricity and draw dust and lint away from sensitive chips. The pad is made of inert conductive foam, laminated to a tufted fabric and contains no sprays or chemicals. Amber Enterprises, P.O. Box 7439, Greenville, SC 29610, \$5.95

Escape From Denna, a 32K ECB graphics Adventure set in the medieval Castle of Denna. The Adventurer is challenged to escape the dark, damp and stinking dungeon of the Castle Denna armed with nothing more than good sense and survival skills. Ark Royal Games, P.O. Box 14806, Jacksonville, FL 32238, cassette \$25.95, disk \$28.95

Island Adventure, a 32/64K graphics oriented Adventure game requiring a disk drive. The scenario: your private aircraft crash-lands on a remote Atlantic island. You awaken uninjured to find your demolished plane missing its radio. Did it fall into the ocean? Did someone take it during your unconsciousness? Is the island, therefore, inhabited? Where are you? How do you get off this island? Stephen B. Boothby, 435 Dorset Commons #93, So. Burlington, VT 05401, two disks \$11.95 plus \$2 S/H

Battle Stations, a 32/64K one-player interactive game to test skill and strategy. CoCo is your adversary as you face off in this game of tactics. NOVA-SOFT, 4285 Bradford N.E., Grand Rapids, MI 49506, cassette \$21.95, disk \$24.95 plus \$2 S/H

Blackbeard's Island, a 32K Hi-Res graphics Adventure requiring a disk drive wherein you, Tom Wentworth, wash ashore on Captain Edward Teach's (a.k.a. Blackbeard) island paradise. Can you find his treasure

before the volcano erupts? NOVA-SOFT, 4285 Bradford N.E., Grand Rapids, MI 49506, disk \$19.95 plus \$2 S/H

Buzzworm, a 32K maze arcade wherein you guide Buzzworm to eat snakebait and gain points. But as Buzzworm grows longer, it must avoid biting itself; Buzzworm bites are fatal. NOVA-SOFT, 4285 Bradford N.E., Grand Rapids, MI 49506, cassette \$15.95, disk \$18.95 plus \$2 S/H

Color Car, a 64K racing arcade game requiring joysticks. Among the hazards are other drivers, air and water jumps. NOVASOFT, 4285 Bradford N.E., Grand Rapids, MI 49506, cassette \$19.95, disk \$22.95 plus \$2 S/H

Gold Runner, a 64K arcade game with joystick option. The object is to collect all the bricks of gold on the screen, avoid the guard and reach the top of the screen where an escape ladder appears. NOVASOFT, 4285 Bradford N.E., Grand Rapids, MI49506, cassette \$14.95, disk \$17.95 plus \$2 S/H

Moneypoly, a 32K CoCo version of the popular board game "Monopoly" requiring joysticks and containing all the features of the original game. NOVASOFT, 4285 Bradford N.E., Grand Rapids, MI 49506, cassette \$19.95, disk \$22.95 plus \$2 S/H

Panic, a 32K arcade game requiring joysticks. The object is to dig holes and wait for a Meany to fall in, then bury him before he gets out. NOVASOFT, 4285 Bradford N.E., Grand Rapids, MI 49506, tape \$14.95, disk \$17.95 plus \$2 S/H

Scepter of Ursea, a 32K graphics Adventure requiring a disk drive wherein you explore the countryside and harbors of exotic Ursea where dragons dwell. Prickly-Pear Software, 2640 Conestoga Avenue, Tucson, AZ 85749, disk 29.95 plus \$1.50 S/H

EARS, a 32/64K audio recognition device to allow users to train CoCo to recognize their voices for hands-off programming. Up to 64 voice prints can be loaded into memory and then saved to tape or disk. Speech Systems, 38W 255 Deerpath Road, Batavia, IL 60510, \$99.55

The Best Screen Dump Utility for Epson Type Printers, a 16K screen dump utility featuring three sizes of printouts (11 by 7 cm., 17 by 17 cm. or 28 by 28 cm.), double-strike option for darker printouts, reverse printing switch and use of double-density, bitimage mode. CMD Micro Computer Services, Ltd., 10447-124 Street, Edmonton, Alberta, Canada T5N 1R7, cassette \$14.95 plus \$2 S/H

The Disk Pilot, a 32K disk maintenance utility that features error trapping, complete information on any file including granules used, size, execute addresses, copies, kills, renames files and is cursor driven. CMD Micro Computer Services, Ltd., 10447-124 Street, Edmonton, Alberta, Canada T5N 1R7, tape \$14.95 plus \$2 S/H

Disk Utility Package, a 32K utility including the following programs: Archive, to save tape to disk; Backup, supports 40-track systems; Format, replaces DSKINI, will work with 35- or 40-track systems; Find, reports all occurrences of a pattern; Compare and Menu. CMD Micro Computer Services, Ltd., 10447-124 Street, Edmonton, Alberta, Canada T5N 1R7, disk \$19.95 plus \$2 S/H

HIRES+, a 16K high resolution text display with BASIC enhancements. Features include true upper- and lowercase displays with 24 lines and scroll protection, same version for either cassette or disk systems, variable line width and instant change between two character sets. CMD Micro Computer Services, Ltd., 10447-124 Street, Edmonton, Alberta, Canada T5N 1R7, cassette \$19.95 plus \$2 S/H

Label Maker 3.0, a 32K ECB utility for printing labels compatible with all types of printers. Features include Hi-Res screen preview before printing, automatic centering, all defaults can be customized and same version for cassette or disk systems. CMD Micro Computer Services, Ltd., 10447-124 Street, Edmonton, Alberta, Canada T5N 1R7, tape \$19.95 plus \$2 S/H

Magazine Index System, a 16K utility requiring a disk drive to keep track of magazine articles. Features include transfer utility insuring compatibility with other database programs, fast search routines and the saving of data in a compressed format for more records per disk. CMD Micro Computer Services, Ltd., 10447-124 Street, Edmonton, Alberta, Canada T5N 1R7, disk \$14.95 plus \$2 S/H

CBASIC, a 32/64K programming utility requiring a disk drive to convert Color BASIC programs into machine language programs. Features include over 100 BASIC commands and functions that support disk, tape, screen and printer I/O, high and low resolution graphics, sound, play and string operations. Also included is a full-featured BASIC program editor using a 51.64 or 85-by-24 line display. 64K is recommended. Cer-Comp, 5566 Richochet Avenue, Las Vegas, NV 89110, disk \$119 plus \$2.50 S/H

Speak Up! 3.3, a 16/32/64K text-to-speech converter using just over 7K. Features include voice synthesizer requiring no additional hardware, may be embedded in BASIC to give your programs voice and documentation with hints to help CoCo's pronunciation and change the pitch of voice. Educational Micro, Inc., 1926 Hollywood Blvd., Suite A620, Hollywood, FL 33020-4524, cassette \$29.95

Insights into Personal Computers, a book of general information about PCs with overviews of the history of PCs, the anatomy of the portable computer, the role of communication technologies in the PC revolution and chapters dealing with the structure capabilities and design of PC software. The Institute of Electrical and Electronics Engineers, Inc., 345 East 47th Street, New York, NY 10017-2394, \$29.50 plus \$2 S/H

Trigger 64, a 64K machine code utility for the CoCo 2 that acts as an interface between EDTASM and BASIC, allows switching between the two and EXECS ML routines in BASIC with crash-proof EDTASM edit buffer. Master Creations, P.O. Box 2040, Pine Bluff, AR 71613, cassette \$34.95, Arkansas residents please add 4% sales tax

OTERM, a terminal emulation program requiring 64K, OS-9, at least one disk drive with controller, a deluxe RS-232 Program Pak, TRS-80 MultiPak Interface or PBJ CC-Bus and modem. OTERM permits you to use CoCo as a terminal to access BBSs, information services or any host computer (even another CoCo) that supports communication with remote terminals. New World Technologies, Box 1209, Dublin, OH 43017, \$39.95 plus \$2 S/H

Kansas City BASIC, an OS-9 implementation that requires 7K for the program and approximately 2K for data and program storage. Feature enhancements include functions such as PEEK and POKE, variables dynamically located, sequential and random disk files provided using standard operating calls, OS-9 Shell commands can be executed from command line and ability to add floating point math. Steve Odneal, 8609 East 73 Terrace, Kansas City, MO 64133, disk \$25

Tele Addresser, a 64K record-keeping utility requiring a disk drive. Features include over 1,000 records per disk, printing of address labels, telephone record organization, telephone directory printing, sales call formatting and sequential alphanumeric ordering of any field users select. PKM Software, 1117 Denton Street, Lakeland, FL 33803, disk \$49.95 plus \$2.50 S/H

Software Success, a book by Brian King advising programmers on how to mar-

ket software successfully. Included are chapters on planning a software business, finding markets for software and deciding what software to market. Potomac Pacific Engineering, Box 2027, Gaithersburg, MD 20879, \$4.95

Investograph, a 32K ECB investment analysis tool requiring a disk drive. Features include analysis of price and volume data (high, low and closing prices and trading volume) for stocks, bonds, listed puts and calls, stock indexes, stock futures, mutual funds and commodities. Radio Shack Stores nationwide, disk \$49.95

Orchestra-90CC, a 16K combination of software and hardware to make you maestro of your own electronic orchestra and transform CoCo into a programmable music synthesizer. Features include a cartridge that connects CoCo's I/O connector to your stereo to produce a stereo synthesizer; six octave ranges; up to five simultaneous voices using two stereo channels; Music Language programming method that lets you enter all components of a piece of music line by line; four or five voices, each of which can be assigned to any of five instrumental choices (tone color registers); one program in ROM allowing you to create, play, load, edit and save to tape or disk; and a Transfer Mode to transmit files via a 300 Baud modem. Software Affair, distributed by Radio Shack, available at Radio Shack stores nationwide, \$79.95

BriteFace, an intelligent serial-parallel interface requiring a Centronics compatible parallel printer, a 110-volt, 60 Hz power source and CoCo with Color BASIC 1.1 ROM or later, which samples incoming data and computes transmission rate for maximum efficiency. Spectrum Projects, Inc., P.O. Box 21272, 93-15 86th Drive, Woodhaven, NY 11421, \$59.95 plus \$3 S/H

The Seal of Certification program is open to all manufacturers of products for the Tandy Color Computer, regardless of whether they advertise in THE RAINBOW.

By awarding a Seal, the magazine certifies the product does exist — that we have examined it and have a sample copy — but this does not constitute any guarantee of satisfaction. As soon as possible, these hardware or software items will be forwarded to THE RAINBOW's reviewers for evaluation.

Monica Dorth

Trivia — A Question Feast For The Trivia Buff

True or False? Henry Fonda played the leading role in the movie High Noon.

If you answered "true," shame on you. Everybody knows Gary Cooper was the star of one of the last great movies of an era that was dominated by cowboy heroes. Clint Eastwood? He was just an also-ran on an old TV series called Rawhide.

Here's one for you sports fans: Who is the leading home run hitter of all time in baseball's major leagues?

Babe who? How long has it been since you've been to a game? The correct answer, of course, is Henry Aaron. Now, who was Aaron playing for when he connected on his historic blast? How old was he?

If such information captures your interest, welcome to the growing club of trivia buffs who thrive on bits and pieces of sometimes inconsequential facts from the past. You will probably also enjoy Trivia, a new quiz program from Moore Computer Services featuring 500 questions in the following categories:

- A) Entertainment, Movies, TV, Music
- B) History, Geography, Politics
- C) Art. Literature, Science, Nature

ENHANCED, EPROM-ABLE DISK BASIC

Now, you can supercharge Basic with an impressive array of extra features WITHOUT sacrificing compatibility! ADOS is compatible with virtually 100% of commercial software. Customizing utilities are provided to allow user-defined command abbreviations, baud rate, step rate, tracks per disk (35 or 40), support of double-sided drives, and more. After customizing ADOS, you can have if burned into an EPROM that plugs into the Disk Basic ROM socket, or just use it in RAM as a 54K disk utility (EPROM + burning will cost about \$20-we provide information concerning how you can have this done.) Features include: repeat and odit of the last direct-mode command + 26 definable control-key abbreviations * automatic line-number prompts + DOS command + lowercase command entry (a fine complement to a Lowerkit or PBJ WordPak) * COPY (filename) to (drive number) * AE error override option + RAM command (84K) * RUNM command * text cohing to printer * ML monitor * text file scan * enhanced directory * error trapping * hi-res text utility included (42, 51, or 64 characters per line).

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Golor Micro Journal, February 1985
"I WON'T PART WITH MY ADOS EPROM FOR ANYTHING ... NO COMPATIBILITY

Hot CoCo May 1985

THE PEEPER

ML PROGRAM TRACER

Monitor machine-language programs AS THEY ARE RUNNING! Peeper actually timeshares with the target program, giving FULL CONTROL as ML programs run. Switch instantly between wastehing regular program output and Peeper's trace of registers and stack on screen or printer. Inspect memory in any of 26 display modes. Execution speed can be varied from full speed to the barest crawl, or halted entirely. as programs run. Single-stepping, breakpoints, memory or register examinerichange. Relocatable, supports 64K use, (16K required). See February '85 review, Disk. \$23.95. Tage. \$21.95. Assembler source listing. Add 3.00. Disk \$23.95 Tape .. \$21.95 Assembler source listing Add 3.00

FASTAPE THE NEXT BEST THING TO A DISK DRIVE

Fastape allows cassette I/O at 3000 baud-TWICE NORMAL SPEED. It uses the high-speed (POKE 65495,0) mode, and makes it convenient to stay in this mode throughout. Features automatic adjustment of cassette and printer parameters when speed mode is changed. Control-key functions for many Basic commands and for changing speed modes. Compatible with all flie types, and can be used with Telewriter-64 and many other tape utilities.

Tape...\$21.95 (10K required) See July '83 review.

SPECTROSYSTEMS

11111 N. Kendall Drive, Suite A108 Miami, Florida 33176 (305) 274-3899 Day or

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D) Sports, Games, Leisure

E) Mixed Subjects (all of the above)

Something for everybody, right? Well, most of us anyway. If your interest isn't listed, don't fret; in the documentation accompanying the program, Moore promises there will be 23 additional "volumes" released during the next few months.

They seem to have thought of everything. There is a 32K disk version, a 32K cassette version and even a 16K cassette version (which has eight different quizzes of 50 questions each — four on each side of the cassette). All three versions feature three clock speeds, for beginners, advanced players and geniuses, respectively.

Extended BASIC is not required, they note, which is good for those who do not have this feature on their CoCo. What this means, of course, is that graphics are held to a bare minimum. It also means you're looking at a screen that is largely green most of the time, except for the questions. By turning down the color on the TV, my eyestrain was greatly alleviated.

The authors appear to have done thorough research on the questions in every category. And they show a lot of thought in the questions selected — except for the true and false questions, most of them have up to eight multiple choices.

You have two opportunities to answer the questions (unless it's in the true or false category) and your score for that turn depends upon how fast you answer before time runs out. There's a clock at the bottom of the screen, which is at once helpful and distracting, especially if the question is a difficult one.

After answering the question, you're ready for another. However, I found the flashing prompt "Press any key for the next question" to be unnecessary and downright irritating — especially after trying to beat the clock on the previous round. It had a kind of neon-light effect, trying to dazzle me when I wasn't in the mood for it.

I was also a little annoyed that there was no random selection of questions. They seem to be in the same order for every category every time the game is played. There is too much programming information readily available for the authors not to take advantage of it.

Aside from these minor irritations, Trivia is a good program. And if the authors follow through with 23 additional volumes, I'm sure we'll see some dramatic improvements along the way. They are off to a good start.

(Moore Computer Services, 1090 East Country Club Circle, Plantation, FL 33317, cassette \$19.95, disk \$21.95)

- Charles Springer

Hint . . .

Recording CoCo Music

If you want to record the sounds produced by the CoCo's sound generators (say, from a music program), you can do it easily using the cassette recorder (if you use one with your CoCo) by unplugging the smaller gray plug or entering MOTORON. Note that this doesn't apply to speech or sound generator packs you may have plugged into the cartridge port.



MANAGER

Color Disk Manager will do selective initializations, verifies, backups, repairs and much more!

- will initialize single tracks, a range of tracks, or the entire disk to more than 35 tracks
- allows you to make a backup of the directory out of reach of basic and put it back if a directory crash occurs; has a recover file command which will load entire files off the disk if the directory crashes and the allocation table is good; will repair or salvage crashed disk several wavs
- is 64K compatible allowing a 64K backup; does backups by track. a range of tracks, or the whole disk (will do more than 35 tracks)
- gives an allocation table map with granules x-referenced to tracks and sectors, and showing which granules are used; displays a file granule map showing which granules, tracks, and sectors the file uses, and the length
- will do a directory displaying file names in two columns, the num ber of free granules, and the free bytes if below 65535; has a kill file command
- loads and saves, sectors, tracks or files, loads files two ways, as done by basic, or with header bytes left in, which helps in studying how files are saved on disk; has an append sector command
- verifies tracks or the entire disk showing the track and sector if an error occurs, with the option of continue or stop
- is multiple drive compatible
- allows you to save a block of memory to disk; transfers programs from tape to disk
- has a rapid scan feature which allows you to scan the disk by tracks and sectors using the arrow keys
- will dump memory to the screen in ascii, good for listing basic programs or source files; has a move memory block command, and a transfer control command
- converts decimal to hex or hex to decimal
- allows you to examine memory using the arrow keys with displays in hex (or decimal) and ascii
- will load and execute rompac's saved on disk; has a move rom to ram command
- allows you to change origin (start addr.) of ML programs; displays the start, end, and execute addresses of ML programs
- 32K 64K ECB \$34.95 Disk

RAINBOW SCREEN MACHINE

- Add these features to your computer/program: ML extension of Basic loads on top of 16, 32, or 64K machines to enable easy mixture of hi-res graphics and text in your programs. Dense text or large lettering for children, visually impaired or VCR title screens with no programming!
- User definable 224 character set featuring lower case descenders, Greek, cars, tank, planes, etc., completely interfaced with all keys, commands, and PMODES. 12 sizes (most colored) from 16 x 8 to 64 x 24. PRINT (a, TAB and comma fields are fully supported.
- 2 distinct character sets automatically switch for sharpest lettering featuring underline, subscript, superscript, reverse video, top and bottom scroll protect, double width, colored characters in PMODE 4, and help screen.
- Simple 2-letter abbreviated commands inside your program or control key entry from keyboard, even during program execution!
- Includes demo program, character generator program and man-ual. 16K Basic required 32K recommended. \$29.95 Tape; \$32.95 Disk.

COLOR DISK COLOR TAPE MANAGER

- merges multiple basic programs into one; appends multiple machine language programs into one; appends machine language to basic (example included)
- converts numbers from hex to decimal or decimal to hex; allows input in hex or decimal
- rapidly scans memory using the arrow keys with auto-key repeat
- displays memory in hex (or decimal) and ascii; allows the changing of memory in decimal or hex
- deals with missing end of file blocks; loads and saves data with or without a filename block
- handles programs with varying block lengths
- displays the start, end, and execute addresses of ML programs; displays the buffer start, end and top addresses
- converts ML programs into basic data statements which can be loaded as, or merged with, a basic program
- turns the audio and cassette motor on and off with one key commands; has inverted displays which lessen eye fatique
- finds the end of programs on tape even from within a program with a skip file command; allows the transferring of control to other programs with a go command
- moves blocks of memory from start through end address to new start address: allows the changing of the origin (start adds) or ML programs
- has an 8,380 byte loading buffer with 16K systems and 24,760 byte loading buffer with 32K systems
- 16K ECB mimimum \$19.95 Tape \$22.95 Disk

SUPER SCREEN MACHINE

All of the features of Screen Machine and more:

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- Variable volume KEY Click (tactile feedback)
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- Superpatch + command for instant compatibility with the Superpatch + Editor- Assembler.
- True Break key disable and recognition.
- 10 User Definable commands used to activate your special drivers or subroutine.
- Dynamic Screen Dump command for use with Custom Software, Engineering's Graphic Screen Print program for simple printer "Snapshots" of your screen even during program execution!
- Super Screen Machine \$44.95 Tape; \$47.95 Disk.

Screen Machine can be used in games, word processors, utilities, etc. In addition, the custom graphics characters can be used to develop easy, effective hi-res character-graphics programs. The potential is

Screen Machine is fully interfaced with all keys and commands. Although some Basic programming knowledge is recommended just a few minutes spent studying and referencing your computer's Basic manuals will turn you on to the power of computing with Screen Machine.

Screen Machine can be used to directly create video recorder title screens or large lettering for children or the visually impaired simply by

Dealer and author inquiries are always welcome. Canadian dealers should contact Kelly Software Dis-tributors, Ltd., P.O. Box 11932, Edmonton, Alberta T5J-3L1, (403) 421-8003.

Disk software compatible with Radio Shack DOS only.

SUGAR SOFTWARE

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A complete catalog of other sweet Sugar Software products is available.

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Get Organized With Easy-To-Use Merge 'n Mail

I need to get organized. My boss keeps telling me to get organized, my wife thinks I should get organized and my kids think I should get my stuff together. It's not that I am a sloppy person, I just use the "file by pile" method of storage and retrieval. When something comes in I need to keep, I put it in a pile. The problem is that I end up with piles of stuff here, there and everywhere, and I spend too much time rooting through piles looking for stuff I know is there, but I just don't know where.

All I needed was the correct software to help my CoCo store things and retrieve them on command in a usable format. To my assistance comes *Merge 'n Mail* from the folks at Computerware. Designed primarily as a mailing list maker, this program has additional capabilities and also functions as an easy-to-use mini-database.

The emphasis with this program is on ease of use. Unlike dBASE III, which I have great difficulty using because of its complexity, Merge 'n Mail is very easy to use.

The fields which would normally be used to generate a mailing list are preset. These fields are:

	Maximum characters
Last Name	15
First Name	13
Company	26
Address	30
City	20
State	2
ZIP	5

There is also a set field for telephone numbers.

Additionally, there are up to 12 fields which can be configured by the user. For these fields, the user also specifies the number of characters each field contains. Once these fields are set, changes can be made to the data stored in the data file, but not to the fields themselves and their characteristics.

These additional fields can be used to store information which you want to store about the person, but not necessarily print on a mailing label (such as birthday, spouse's name, etc.). Examples are given in the well-documented instruction manual. These would aptly pertain to a computer club. In that instance, pertinent data could be the number of drives, maximum memory and date dues are due.

Merge 'n Mail can also print out the data on standard 8½ by 11-inch sheets as well as labels. Two choices are offered: long listing with all the programmable fields, or a short listing with just the name and address fields.

For printers offering compressed printing (132 characters in the normal 80-column space), the program allows you

to enter the printer control codes for compressed and expanded typestyles to obtain maximum function from your printer. My DMP-100 does not have this capability, so I used the standard short listing mode which worked just fine.

Once data has been entered, it can be recalled for examination, changes, additions or deletions. Several search options are given to assist you in finding a particular file in the database. As new persons are added to the database, the entire file is re-sorted by last name. When labels are printed, you are given the option of re-sorting by ZIP code, since significant mail cost savings are available if bulk mailings can be presorted by ZIP code.

Merge 'n Mail also has a feature which allows you to merge the information in your database into a form letter that won't look like a form letter. (Hence the "Merge" in Merge 'n Mail).

After composing a letter on any of the disk-based, ASCII-generating word processors (Color Scripsit, Telewriter changed to ASCII output, VIP Writer, etc.), you put control codes where you would normally put the name, address and the other data which is now contained in your database files. Merge 'n Mail then pulls this data out, prints the information, justifies the remainder of the text and continues onward until the list is completed. Voila! Form letters without the "form letter" look. My friends and relatives are going to be surprised when they start receiving letters from me. I've even put a field for birthdays in each file so birthday cards will be on time.

My list of suggestions for improvements for Merge in Mail is a short one. The first eight fields are fixed regarding subject and field width. While this simplifies the set-up routine for most mailing applications, the lack of flexibility regarding field width creates some problems.

The ZIP code block is set to five spaces, thus eliminating the ability to use the six-digit Canadian alphanumeric postal code. The first name is set at 13 spaces. Enough for one first name, but I ran into problems with entering the first names of married couples I wanted to include on one letter (i.e., Dear Maryanne and William). The ability to specify the field width in the first eight fields would eliminate this problem, or just adding a few more spaces to these field widths would help.

If you are very good at BASIC, you can go into the program and modify it, but be forewarned that it was written to be memory efficient, not easy to modify. I took a peek at the listing and gave up.

The other limitation is only one mailing list can be on one disk, even if it is a very short one. Not a big problem, except that disks (and the required backups) are not cheap.

Merge 'n Mail requires a 64K disk CoCo. This is not a problem with the program, as the features justify the memory required; it just limits the number of potential users.

Overall, I consider it an excellent program — more than just a simple mailing list and less than a full-featured database. Considering the price, it is quite a value.

(Computerware, 4403 Manchester Ave., Suite 102-Box 68, Encinitas, CA 92024, requires 64K, disk \$27.95)

- Bruce Rothermel



Compare it with the rest. Then, buy the best.

If you've been thinking about spending good money on a new keyboard for your Color Computer, why not get a good keyboard for your money?

Designed from scratch, the HJL-57 Professional Keyboard is built to unlock ALL the potential performance of your Color Computer. Now, you can do real word processing and sail through lengthy listings...with maximum speed; minimum errors.

At \$79.95, the HJL-57 is reasonably priced, but you can find other CoCo keyboards for a few dollars less. So, before you buy, we suggest that you compare.

Compare Design.

The ergonomically-superior HJL-57 has sculptured, low profile keycaps; and the three-color layout is identical to the original CoCo keyboard.

Compare Construction.

The HJL-57 has a rigidized aluminum baseplate for solid, no-flex mounting. Switch contacts are rated for 100 million cycles minimum, and covered by a spill-proof membrane.

Compare Performance.

Offering more than full-travel, bounce-proof keyswitches, the HJL-57 has RFI/EMI shielding that eliminates irritating noise on displays; and four user-definable function keys (one latchable), specially-positioned to avoid inadvertent actuation.

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Your HJL-57 kit includes usage instructions and decimal codes produced by the function keys, plus a free sample program that defines the function keys as follows: F1 = Screen dump to printer. F2 = Repeat key (latching). F3 = Lower case upper case flip (if you have lower case capability). F4 = Control key; subtracts 64 from the ASCII value of any key pressed. Runs on disc or tape; extended or standard Basic.

Compare Installation.

Carefully engineered for easy installation, the HJL-57 requires no soldering, drilling or gluing. Simply plug it in and drop it right on the original CoCo mounting posts. Kit includes a

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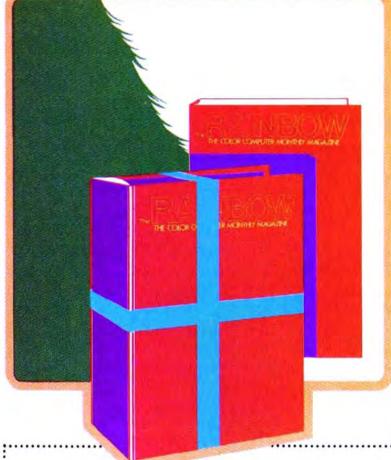
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Ordering Information: Specify model (Original, F-version, or CoCo 2). Payment by C.O.D., check, MasterCard or Visa. Credit card customers include complete card number and expiration date. Add \$2.00 for shipping (\$3.50 for Canada). New York state residents add 7 % sales tax.

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Guide To Computer Magazines Is Comprehensive And Informative

Are you searching for computer publications to suit your particular needs? Steve Davis Publications has a new book, Guide To Computer Magazines, that will make your search easier. Guide To Computer Magazines is divided into three major areas: 1) Popular and General Interest Magazines, 2) Trade and Professional Magazines and 3) Newspapers and Newsletters.

Francis Amato, the author, tried to include as many details as possible about each publication. Some of the publishers did not respond to requests for information; consequently, data concerning these publications is rather limited. On the other hand, many of the publishers did respond with a wealth of data. Information such as description of the audience, the editorial scope, regular features and subscription information is provided. (The description of RAINBOW takes up nearly a page.)

One of the most useful parts of Guide To Computer Magazines is the "Subject Index." Applicable publications are listed under specific subject areas. This is a partial list of subject areas that CoCo users might find interesting: Computer Languages, Databases, Education, Epson, Games, Graphics, Handicapped, Legal, Tandy/Radio Shack and Telecommunications.

The "Title Index" lists the publications in alphabetical order and gives the page where the publication is described. By using the "Subject Index" and "Title Index" you can quickly find publications that will meet your needs.

Overall, I think Guide To Computer Magazines will make a good reference addition to your CoCo library.

(Steve Davis Publishing, P.O. Box 190831, Dallas, TX 75213, \$9.95)

- Gabriel Weaver

New Lisbon, WI

One-Liner Contest Winner . . .

Run this graphics One-Liner and see how long your eyes can last!

The listing:

Ø POKE65495,Ø:S=1:Z=RND(-TIMER):
PMODE4,1:COLORØ,1:PCLS:SCREEN1,Ø
:DRAW"BMØ,Ø":FORZ=ØTO1STEPØ:A=RN
D(192)-1:DRAW"M=Y;,=A;":Y=Y+4:S=
NOTS:SCREEN1,S+2:IFY=>255THENY=Ø
:DRAW"BMØ,Ø":NEXTELSENEXT'
RAINBOW-----FLASHWAVE----1 LINER

BY MARC ANDREESSEN

Marc Andreessen

(For this winning one-liner contest entry, the author has been sent copies of both The Rainbow Book Of Adventures and its companion Rainbow Adventures Tape.)

Personal Bookkeeping 2000 Has Significant Improvements

Personal Bookkeeping 2000 is an enhanced version of Personal Bookkeeping 84. In the November 1984 issue of THE RAINBOW (Page 214), I did an extensive review of Personal Bookkeeping 84. This version is basically the same program, except the author has modified many of the areas I found objectionable in the original review.

Those improvements include the ability to easily define your own expense categories rather than have to live with those selected by the author. In the original program, it only provided for check numbers of three digits; you can now enter four digits. I think this will meet the needs of most users. You can now easily add service charges to your accounts which makes it much easier to reconcile accounts.

In the earlier version, it was assumed we all would make entries into our bookkeeping system on a daily basis. Because of this you had to go back to the main menu to change dates. With *Personal Bookkeeping 2000* that is not necessary and, believe me, it makes data entry much more user friendly, especially for those who enter these type records on a weekly basis.

Another significant improvement is in the documentation. It's more clear than the original and the author has included a tutorial that shows how to use most of the major functions of the program.

Personal Bookkeeping 2000 is a powerful program that is user friendly. It provides the user with a wealth of information. It requires 32K ECB, disk drive and printer.

(AMDT-Stardancers, 762 Brady Avenue, Bronx, NY 10462, disk \$39.95 plus \$1.50 S/H)

- Michael Hunt

One-Liner Contest Winner . . .

This one-liner, inspired by some previous one-liner contest winners in THE RAINBOW, is called *Cosmic Birdhouse*.

The listing:

1Ø CLS:PMODE1,1:PCLS:SCREEN1,Ø:D
RAW"BM45,61;L5ØE7ØF7ØR1ØU2ØR1ØD1
1ØL1ØØU1ØR2ØU5L25D1ØR1Ø5H4G4H1ØE
6U5L2ØD6L12ØD4ØR2ØØF5E5F5E5F5U2Ø
ØL99D1ØØL1ØØU4ØBM47,67;E5F5G5H5"
:PAINT(4Ø,44),2,8:PAINT(2ØØ,62),
4,8:PLAY"L25;A;Ø3;A+;A-":FOR X=1
TO 112Ø:NEXT X:GOTO 1Ø

Michael Holt Victoria, British Columbia

(For this winning one-liner contest entry, the author has been sent copies of both *The Rainbow Book Of Simulations* and its companion *Rainbow Simulations Tage.*)

Probaloto - Not Just A **Random Number Lottery**

It's in the news a lot lately: "Local Citizen Wins Millions in State Lottery." With more and more states getting into the lottery business, *Probaloto*, by Gary Olander, may be just the ticket for you.

The documentation points out that *Probaloto* is not "just another random number-generating lottery program"; the object, however, is to pick the numbers to win you millions. This machine language program is available on tape for 16K ECB, while the version I received on disk requires 32K ECB (or 64K under JDOS). It is well-documented and the program is menu driven — it's so easy to use that after going through the documentation once, you'll probably file it away.

The user is prompted for information about the particular lottery being entered: how many numbers are picked and out of how many numbers. The example given for a regular lottery picks six numbers, from one to 40, but these parameters can be changed. Output can be routed to the screen, or to screen and printer. Printer Baud rates from 300 to 9600 can be selected.

The first three selections from the main menu are strictly random number generators. The first picks three numbers (zero to nine), the second picks four numbers (zero to nine)

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and the third picks six numbers (one to 40), for what is called the regular lottery game.

The fourth selection from the main menu is labeled "weighted" random selections. This is the feature which makes the program more than just a random number generator. The user has the option of setting up weighted data files using lists of past winning numbers which are available where lottery tickets are purchased. This is easily done by answering prompts to input the number of times each number (one to 40 or zero to nine) has been a winner. These files can be labeled and saved to disk (or tape) and a hard copy can be listed by the printer.

The weighted random selection process can use these data files in one of two ways. If the user feels that the process used to select winning numbers picked twice as many 4s as 17s in the past, and is, therefore, likely to continue that trend in the future, Probaloto can weight towards the most-picked numbers. In the example given, the program would be twice as likely to "randomly" select a 4 as a 17. If, however, the user feels that Lady Luck plays her hand such that poor old 17 is due, the program can weight toward least-picked numbers.

This weighted selection procedure can also be used to set up data files which will favor the selection of your lucky numbers, or conversely, tend to avoid your unlucky numbers.

To test this weighting process, I wrote a short BASIC program to generate at random regular lottery-game winning numbers. I input 60 sets of six numbers into a data file and used this to have Probaloto make selections weighted toward the most-picked numbers. I then had Probaloto make an equal number of selections strictly at random. When these results were compared to my original list, the weighted selections produced 7.5 percent more matches than the random selections. My original list was fairly well-distributed. More pronounced variations in frequencies in the data input would have added to the weighting effect and increased that percentage.

My criticisms of Probaloto are very minor. The data file printout produced by the program is a narrow column near the left margin consisting of numbers and the times each has been picked. For a regular lottery game this column is 40 lines long, using much more paper than would be necessary if the output were better formatted. Also, when finished with either printing or saving a data file, the program returns to the beginning with initial questions about your state's lottery. It would be more useful to return to the main menu at this point. Lastly (dare I be so picky?), the word "array" is misspelled on one of the screens.

If you are into playing a lottery and believe the game is truly random in practice as in theory, stick to the random number generator already in your CoCo. On the other hand, if you feel that Lady Luck is not always random and want to use some sophisticated mathematics to bring her in on your side, then Probaloto may be just the thing for you. I'll second the program's sign-off message: good luck!

(Gary Olander, 322 Haymarket Pl., Gahanna, OH 43230, 16K ECB tape or 32K ECB disk, \$19.95)

Stanley Townsend

Dungeon Quest Combines Adventure Intrigue With Arcade-Game Action

Dungeon Quest by Computerware is a graphics Adventure game using a combination of the keyboard and joystick. Both 32K Color BASIC and a joystick are required to play the game. The action is similar to games played on home video arcades which involve using a joystick with a touch pad combination.

In the game, you are a lad named Brodric who has just come of age. He is a restless lad and decides to go out into the world and make his fortune. His father gives Brodric his inheritance, a rusty old sword which is rumored to be magical. As Brodric travels to the East, he hears tales of an underground palace nearby. To make a long story short, the emperor named Darius dies of a plague and, having no heir, decrees that the finder of his crown will rule his empire. The story has it that the crown has never left the keep.

A fortnight later Brodric enters the dungeon and within a few steps the floor gives and he tumbles into the depths of the dungeon. This is where we start our quest; with pencil and graph paper, I began. After several deaths, many hours and a few bottles of eye drops, I found the crown but discovered I did not have the right key to open the door, so the quest went on.

Your disk or cassette comes with two versions of the game, LOAD in the version you want and you're off. The game auto-executes; all you need to do to get started is answer the questions: "Do you want to have the objects randomize Y/N" and "Which level of difficulty do you want, 1, 2 or 3?" Both game versions are different, the second being a more complex maze of tunnels, corridors and rooms.

There are several types of treasures which, besides increasing your wealth, also move you up the social ladder. You are only able to carry eight objects at one time, meaning you must make frequent trips back to the start of the dungeon to drop off some of your treasures in order to get more. In addition to treasures, you may also find other weapons or keys to aid you in the game. The joystick control for the character is adequate, but controlling the weapon is difficult at best. In addition to escaping with treasure, you may also increase your score by fighting the monsters.

I found *Dungeon Quest* to be quite enjoyable if I mapped it out. Otherwise, it became merely a pointless trial-and-error search of an extremely complicated maze. If you enjoy Adventures and arcade games, you will surely like this combination of both.

(Computerware, P.O. Box 668 Encinitas, CA 92024, cassette \$24.95, disk \$27.95 plus \$2 $\rm S/H$)

- Stephen Hess

CoCo Checkbook Disk: As Good As The Tape Version

First, I would like to refer you to the Color Checkbook review I did which appeared in the April 1985 issue of THE RAINBOW, Page 210. The very last line of the review reads, "Now all we need is a disk version." Well, that is exactly what we have!

Spectrum Projects is now selling CoCo Checkbook Disk, the disk version of this useful utility which allows one to balance the checkbook. This version is every bit as good as the original, and even better for those with disk systems. All of the original features (modified to work with disk data files) are there. The manual is again professionally done with many helpful hints and advice.

FOXX Software has made all of the needed modifications to make this a perfect checkbook balancer. Now we have everything!

(Spectrum Projects, Inc., P.O. Box 21272, Woodhaven, NY 11421, 32K disk \$39.95 plus \$3 S/H)

- Jim Sewell



Print Master Helps Master The Screen Dump

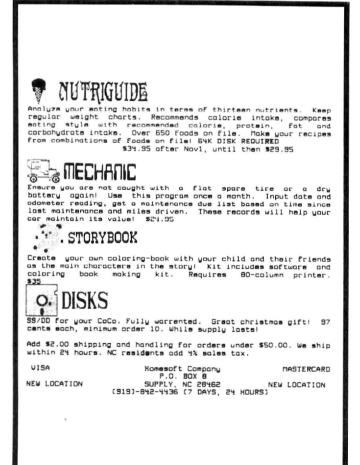
By Dennis A. Church

Print Master, from Dataman International, is a twoprogram package that helps solve the problem of getting the graphics screen to the printed page. You are thinking that this is a graphics screen dump program. Yes, that is what it is, but it is different and more sophisticated in several ways.

Print Master was reviewed from the disk version. It is contained on a single, copy-protected disk and requires a 32K Color Computer; it has some features which take advantage of a 64K CoCo. It is also available on tape.

The main program is titled PMAST (for "Print Master"). With it you select from an extensive list of options designed to load your graphics screen and print it out any way you want it. You select and execute options almost exclusively with joystick and firebutton. They call it "clicking the mouse" and it will work with a mouse, but I found the joystick more convenient.

Ease of use for this program is not very user friendly. The question is, will I instinctively know what to do from the choices presented to end up with what I want? The answer is, "No." But I'm one of those who doesn't think "instinctive" programs are all that possible; I expect to need a manual to operate a complex program. I'll just



say that *Print Master* presents easy options to those who understand the options. It also recovers from improper input without damage to your work. Though you can BREAK in the program, the graphics screens are all intact when you rerun.

The menus available are the Main Menu, File I/O, Image Dump and Dump a Screen. Graphics screens may be loaded from tape, disk, *Graphicom* and *CoCo Max*. Image dump parameters are pixel size (controlling the size of the image), inverse, rotate, dumping more than one graphics screen, shading, tabs, dump using text, as well as a choice that selects a user-programmed option for unique printer codes.

Before dumping one or more graphics screens, you can select the PMDDE and which screen (or portion of screen) you wish to print. You can have two PMDDE 3/4 screens in memory at once; eight if you are in PMDDE 0. A 64K computer gives double this area. The added memory also makes it possible to store screens in high memory, load a second screen and print multiple screens in a user-selected order.

Before any image can be dumped, however, the printer driver must be loaded. If you have a printer of the following type, the driver is included with the program (with more promised in time): Tandy, Gemini, Imagewriter, C. Itoh, Spirit 80, Mannesmann Tally and the CGP-115. If you don't have one of these printers, or you want to employ custom codes in the printer driver, the second part of this program comes into play. It is called *The Customizer*.

The Customizer creates a printer driver for use by Print Master. Even though it is menu driven, it requires a good understanding of your printer. The manual warns that using The Customizer may be difficult because of poor printer manuals and the complexity of dot graphics printing. (That warning rang true on several midnight sessions for me.)

Here is a sampling of knowledge needed to design a custom printer driver: Baud rate, number and configuration of pins in the printhead, Most and Least Significant bit order required and the control codes you want sent to the printer in sets of custom designed strings. The Customizer includes a Store Buffer, Clear Buffer and Test Options capability. Bad control codes can be selectively replaced before saving the file. The file you create from The Customizer is the printer driver you load to Print Master before making a screen dump.

As I mentioned, the manual warns about the complexity of the program. The manual itself is an impressive looking, three-ring binder printed in brown on brown in a curious two-column format. It has an index, a helpful appendix and reproductions of program menus and other illustrations. I suspect the manual was prepared using this program plus two other Dataman programs helpfully explained in Appendix D: Text Master and Graphic Master. Despite these assets, it still requires a careful, cover-to-cover reading to use the program effectively.

I obtained printouts of their test picture and a Graphicom picture you select within *Print Master* from the Graphicom menu on both a Gemini-10X and a Line Printer VII. Options to control the size and rotation of the dump worked well. (No, the program doesn't make the LP VII any quieter.)

Now I must fault this program. Using my Gemini-10X printer, the graphics output invariably left a blank line between printhead passes. Using one-by-one pixel size, the blank was one pixel in size. Larger printouts resulted in larger blanks. "Now is the time for *The Customizer*," I

said to myself. Unfortunately, while the prepackaged screen dumps can be altered and resaved, the driver itself cannot be inspected. I suspected the line spacing was incorrect, but had no way to see what code was sent by the original driver. Further, altering the strings is not possible except

by rewriting from the beginning.

I tried to write an original Gemini dump using The Customizer from the command strings supplied in the appendix. My efforts, guided by the manual and printer manual, produced a misaligned, garbage-laden printer output. I really do feel the fault lies in my inability to correctly design the program, as well as inappropriate information in the appendix. Of course, the manual could include more information. Instead, it warns about the complexity of designing screen dumps.

Whether or not to buy Print Master is, as always, a question of what you need, what you have and what you are interested in. You will find a smoothly functioning, reasonably priced program for your needs if you're in one of these categories: those who need a screen dump program with great versatility for modifying the output, especially with the ability of adding text to the output; those who own an oddball printer requiring a custom designed printer driver; those who use a variety of printers or who plan on changing printers — this program will not become obsolete; and "techie" types (people who will sit up nights designing custom drivers for strange printers that, with joystick selection, will change the screen dump to mirror image, allow five colors or simulate cinemascope movie images). These possibilities are not necessarily Print Master program functions until the user can devise the driver, with The Customizer's help, to make them possible.

The manual offers customer support to registered owners. When I called, I spoke to the program's author, Scott Nudds. He was helpful and friendly. He did suggest that users would be better advised to write with their questions in the interest of clarity and economy. From Mr. Nudds' helpfulness, I'm sure he would promptly respond to letters

from owners.

(Dataman International, 125 South Fifth St., Lewiston, New York 14092, U.S. prices \$33.95 tape, \$37.95 disk; 420 Ferguson Ave. North, Hamilton, Ontario, Canada, L8L 4Y9, CDN. Prices \$39.95 tape, \$43.95 disk)

Software Review.

Personal Program Protection With EZ Cassette Encrypt And EZ Disk Encrypt

If many people use your disks or tapes and you don't want them to be able to access all of the programs, here is a solution. This solution is very easy to use for disk and a bit bulky, but workable, for cassette.

EZ Disk Encrypt and EZ Cassette Encrypt take the file (on disk, any type of file; on cassette, only ASCII files) and exclusive-OR it with any password you choose. Not an extremely stupendous feat, but it does the job.

With EZ Disk Encrypt, the program reads the file off disk a sector at a time, exclusive-ORs it with the password and writes that sector back to the same place on the disk. This could present a problem if an input/output error occurs during the process. Only part of the program would be encrypted and it would not be recoverable. You must have a backup copy of the file before you use this program!

With EZ Cassette Encrypt, the program reads in the entire file before it starts encrypting it. It then does its job and prompts for a name for the output file. This way is not as fast, but it is more reliable than the disk method and the only method possible for cassette. With this procedure, the file can only be so long, but with the disk procedure, a file of any length can be encrypted.

To decrypt a file, rerun the program using the exact same password. It will be decrypted because exclusiveOR-

ing is the exact opposite of itself.

Unless you share disks or cassettes with other people and have confidential files on them, I see no real need for these programs. But if you require such protection, then they will work well for you.

(Landware, 6 Larchmont Road, Edison, NJ 08817, cassette \$25, disk \$29)

Andrew Dater

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EZ Profiler Helps Streamline Programming Techniques

So you've finally written the "Great American Program." It has everything, every bell, whistle, toot and honk you could ever want. You allow yourself the luxury of typing those three letters that make all of your dreams come true — R-U-N. A couple of seconds fly by and the screen remains blank; a few more and still not a sound. You panic. How could your masterpiece have crashed the system? As you quickly grope for the Reset button, the title screen you spent three weeks drawing finally appears. Now you realize the problem is something much worse than a system crash: Your program is S-L-O-W!

A high speed POKE won't help now. It is time to recode, but what part of the program? EZ Profiler by Landware offers an answer, or at least some suggestions.

Before running EZ Profiler, the source program must be saved in ASCII format on the disk. A simple RUN "EZPRO" will get you underway. Upon execution, the program offers instructions that explain the program more completely than the 21/4-page instruction booklet. EZ Profiler will then prompt for the name of the program you wish to modify, and a memory area the input program does not utilize. EZ Profiler will access the drive, read the input program and create a new version of the program



saved as TEMP/BAS. The new version will then be loaded and you must type RUN to execute the new program.

Running the newly created program is exactly like running the old version, except for a speed slowdown as the profiler tabulates the execution data. When the source program is terminated by an END or STOP command or by pressing BREAK, a subroutine that is appended by EZ Profiler must be executed. This routine will dump the tabulations to either the screen or a printer.

The result is simply a count of how many times each program line is executed, which, according to the instruction sheet, "will show... which loops in a program are most heavily used. These loops can then be rewritten... to make the overall program much faster."

The major deficiency of *EZ Profiler* is that it offers no suggestions to speed up the code, nor does it even hint at how to determine which routines are truly "wasteful" and which routines are written as tightly as possible. (For example, a FOR/NEXT loop might have been executed 500 times, but not necessarily be wasteful.)

The instructions that come with the program are adequate enough to operate the program, but really aren't enough to put the program to use, which is the most important reason for using a utility.

Other problems with EZ Profiler include the additional processing time it adds onto the source program (almost a 3,000 percent increase) and the additional memory required. The time factor is only deadly in applications where program flow is greatly changed by timed responses (such as games). In this case, the program is of dubious value.

The memory factor can be dehabilitating. The program appends an additional 20 characters onto each line which, on longer programming endeavors, could prevent the program from loading into memory.

EZ Profiler is not a program that will answer all programming woes. It will help streamline software, but not unless the programmer is willing to put in much more work than the program. EZ Profiler is essentially an extension of BASIC'S TRON command and should be treated as such. It does exactly what it claims, but be wary of reading any other uses into it. Potential purchasers should beware that although EZ Profiler can help hone their programming techniques, the work is still up to them. Happy programming!

(Landware, 6 Larchmont Road, Edison, NJ 08817, requires 32K and disk, \$20)

- Eric Oberle

Hint . . .

Random Number Ranges

Have you ever wanted to devise a simple "odd/even" or "heads/tails" program? These variations on the RND(x) function may help:

RND(2)-1 will yield either 0 or 1 RND(2)>1 will yield either 0 or -1 (RND(2)>1)*2+1 will yield either 1 or -1

RND[2]>1 is especially useful because -1 represents a logic "true" and 0 a "false" in BASIC.

EARS Pioneers The Way For Spoken Command Response

By Randy Graham

Personal computing is a piece of cake. Just turn it on and start typing; it all appears right there on the screen. If you make a mistake, back up and correct it. Write programs in many languages. Run software for word processing, spreadsheeting — even play games. Print it all out letter-perfect then save it and share it. Nothing to it. Unless you have no hands to type or no eyes to see the screen.

I work with handicapped people. Jonathan was a lineman before his accident. Because he severed his spinal cord, he is confined to a wheelchair. He has very poor use of his arms; he needs help to dress and to eat. When I met him, he was beating everyone in the rehabilitation unit at chess. I thought that a good chess player ought to make a good computer programmer.

Paul has had cerebral palsy since birth. He can get around with crutches although it is difficult; his arms and legs just won't do what his brain tells them. His speech is difficult for most of us to understand. He is a college graduate and would like to be a writer, but trying to type can be a tearful frustration for him.

As a result of a disease, everything looks blurred to Betsy. She can manage to read with a magnifying glass, holding the material close to her face; she has not been able to find a computer screen she can read.

For Jonathan and Paul and Betsy, the keyboard and screen which give us access to all the marvels of personal computers are just as formidable barriers to computing careers as the six-inch curb which locks them out of a shopping mall or an office building. We can cut notches in the curbs and build ramps around the steps. What can we do to open up our favorite activity to some very fine people?

It was for these friends and others that I flew to the RAINBOWfest in Chicago to find out what Rich Parry and Lester Hands were up to at Speech Systems. It was fun meeting them and I became so excited about their work that I brought an EARS home with me so I could join the adventure. EARS (Electronic Audio Recognition System) is a device and program through which a Color Computer responds to spoken commands.

Yes, I said spoken commands! No other computer has it — just CoCo. We are coming along with voice synthesizers which can electronically vocalize text in memory, but going the other way? Little more than a year ago I attended a conference in which an expert in the field said that speech recognition was not even on the horizon. He was wrong. Say "hello" to the expert, EARS.

What You Get

In a nice plastic envelope you get two pieces of hardware, a piece of software and a very good manual. One piece of hardware is a ROM pack which contains the magic and the other piece is a headset. There are no carphones in the device; it is just there to hold the microphone close to your mouth. The headset plugs into the ROM pack and you know where that goes.

The software (tape or disk) contains a machine language program, a utility and several demonstration programs. Load and execute the EARS program and you are in business. To the user, the effect is that all of your Extended Color BASIC ROM still works but some new commands have been added. Time to start learning.

How it Works

LISN is the first new command you meet. Like all BASIC commands, it can be used in direct mode or within a BASIC program. Type LISN "1" and say "one." You have taught CoCo/EARS its first word. Let's note that you have also taught it your accent — and language.

EARS is a "speaker-dependent" system. The user teaches the machine and thereby sets up a unique relationship. There is nothing romantic about this; it seems to be the easiest way to do it. A "speaker-independent" system which can recognize any voice in any accent, pitch and inflection must be much more complex. This way, whether I say "one" or "uno" or "ein," when I say it again, EARS will respond with "one." Space is reserved in memory for a speech synthesizer like *Voice*. If you tell EARS to SAY "one," it will speak it from the speech system.

OK, I have taught EARS one word. I can now repeat that process. In its present shape and form, EARS can "learn" 64 strings. Apparently, the program sets up a two-dimension array. One element is a string of up to 16 characters which I type in. The other element is a voice print of what I say into the microphone. EARS calls this pair a "template." Let's see what I can do with this array.

MATCH lets me use the vocabulary list. After this command, I say "one"; there is a noticeable pause, then the screen prints 'I'. EARS has searched the array of voice prints, found a match and printed the character string.

Let's note again that the relationship between the input string and the spoken part is what I want it to be. "Gadzooks" can make the computer type out "My name is Randy" if that is the way I made the template.

What if I forget my own list? TLIST will produce the string part of the list of templates for me one screen at a time. TSAVE will save the whole list of strings and voice prints to tape or disk (EARS checks to see which you are using); TLOAD will load a list so I do not have to do it over every time.

Vocal Programming

Now for the great part. I have taught EARS the digits, alphabet and as many BASIC commands as it will hold. Time for another command.

DRECT instructs EARS to accept BASIC statements from me. I can say "one-zero-a-equals-one-two-three-enter" and a BASIC line appears on the screen. Then, "two-zero-printa-enter" and the second line is in place. I can say "list" and it will (because I added the "enter" to my string); when I say "run," it does it! Primitive? Yes, but I wrote and ran a BASIC program without touching the keyboard! I feel like I have the first horseless carriage in town.

While in DRECT mode, the computer will accept keyboard input, but it will continue to respond to voice commands until turned off with BREAK.

Jonathan is up and dressed and has finished breakfast. It is time to go to work. He rolls down the hall to the den where CoCo/EARS is waiting. He activates a remote control switch by sound or however and the computer

comes on and loads EARS which loads the template list. (This last part will require an enhancement that EARS does not have. Right now, Jonathan would have to leave his computer on and only turn his monitor and peripherals

on and off.)

He says "Terminal" and the screen says RUN "TERM .BIN",R (ENTER). Before starting to work, like many businesspeople, he says, "Get Dow," "Get" tells the terminal program to go to its autodial/autologon section. "Dow" calls and logs on to DJNS. At the menu he says "news" and the screen shows //NEWS (ENTER). He goes through the news by menu selections, reads the Wall Street Journal online and logs off. Now he says, "Get office." Autodial and logon gets him into the office computer. Perhaps he will first read "Mail" and "Memo" before calling for the file on which he is working. It is slow and tedious, having to give all digits and spelling out words. But, he is working!

This is only just barely a fairy tale. If you devote 36 templates to the letters and digits, you only have 28 left for words. But TCLEAR will empty the template buffer so you can load another list tailored to the specific application you are running. And needless to say, he will need the help of a typist to construct his template lists.

Come on Along

It sometimes seems like the pioneering days of personal computing are over. Nobody builds his own any more what did I do with that wirewrapping tool? Hardly anybody writes programs — software is too readily available. Everybody is into graphics. Well, if you sometimes look longingly at the old covered wagon gathering dust in the shed, hitch up. A whole new land mass has been opened for exploration.

Someday there will be listening typewriters that write it all out as you dictate. Other control applications will become as common as digital microwave ovens and calculator watches. And perhaps we will have Hal, the conversational computer, by 2001. But you can still get ahead of the parade. EARS is the place to start, and you can only do it with a CoCo!

I have told you about my excitement with this new tool. I would like to hear from others who are experimenting with EARS for handicapped applications. My complete address is 2115 Buford Road, Richmond, VA 23235. Or, maybe we can share our experiences in the "Letters to Rainbow" department.

I did not write this review with EARS — I am glad I did not have to. It would have taken forever, spelling out each word. If your template list is full, there is a pause of a couple of seconds before the computer responds. And, let's face it, EARS can be quirky. Rich tells you to imagine you are training your puppy. That's the way you must speak. Sometimes I say a couple of words that are not on the template list and get up and walk away. When I do that, I remember the old proverb: "I had no shoes, and complained, until I met a man who had no feet."

(Speech Systems, 38W 255 Deerpath Rd., Batavia, IL 60510, \$59.95)

Test Your Management Skills With *PETSTORE*

Pal Creations is marketing yet another Simulation game. this one called *PETSTORE*. The game has you as an owner of one pet store and \$200. From there it is simple, just buy animals at a cheap price and sell them at a higher price. The complicated part is that you have to keep track of what the price is for each of 20 animals. These animals come in four categories: fish, snakes, birds and amphibians/

If you can remember what the previous prices are for each animal, then it is easy to tell whether to buy or sell. There is some speculation involved, however, in that sometimes even though prices go down, they may go even lower, making you wait longer to realize profits. Another problem you may encounter on the more difficult levels is a greater chance of fire and disease, which will diminish your supply of animals.

The game has little documentation but is fairly easy to play, so it doesn't really need much. If you intend to play the game alone or in a small amount of time, forget it! This game is strictly meant for two to four players and even the quickest game will easily take nearly an hour to complete. PETSTORE does, however, have a practical benefit in that it teaches the basic principles involved in the stock market and other speculation-type investments.

The game comes on cassette only, but can easily be moved to disk. For the money, PETSTORE is an interesting and educational program which is worth the price.

(Pal Creations, 10456 Amantha Ave., San Diego, CA 92126, distributed by CoCoNut Software, RR#2, Site 9, Box 1, Tofield, Alberta, Canada T0B 4J0, 32K ECB cassette \$14.95)

Mark Anderson

Hint . . .

Putting on the Brakes

When using the STOP command to debug your program, ask for the information you want before you request the STOP action. For instance:

1Ø INPUT "NUMBER"; A

2Ø IF A=3 THEN Y=1Ø:X=3Ø

3Ø IF A=4 THEN Y=2Ø:X=4Ø

4Ø PRINT X,Y:STOP

Line 40 shows the format I used. It saves typing in the print request after the STOP command has been executed. A little thing, but it has saved me many finger strokes.

> George B. Sullivan New Carrollton, MD

"The CBASIC Compiler"

Now anyone can create fast efficient Machine Language Programs Easily and Quickly without having to use an Editor/Assembler

CBASIC is a fully integrated, easy to use Basic program Editor and Compiler package. CBASIC is 99% syntax compatible with Disk Extended Color Basic programs, so most Basic programs can be loaded and compiled by CBASIC with little or no changes required. The compiler is an optomizing two-pass integer Basic compiler that can convert programs written in Disk Extended Color Basic into 100% pure 6809 Machine Language programs which are written directly to disk in a LOADM compatible format.

The programs generated by the compiler can be run as complete stand alone programs. A built-in linker/editor will automatically select one and only one copy of each subroutine that is required from the internal run-time library and insert them directly in the program. This eliminates the need for cumbersome, often wasteful separate "run-time" packages.

CBASIC WAS DESIGNED FOR BOTH BEGINNING & ADVANCED USERS

CBASIC is a Powerful tool for the Beginner or Novice programmer as well as the Advanced Basic or Machine Language programmer. The Beginner or Novice programmer can write and compile programs without having to worry about Stack Pointers. DP registers, memory allocation, and so on, because CBASIC will handle it for you automatically. All they have to do is write their programs using the standard Basic statements and syntax. For the advanced Basic and Machine Language programmers, CBASIC will let you take command and control every aspect of your program, even generating machine code directly in a program for specialized routines or functions.

CBASIC adds many features not found in Color Basic, like Interrupt, Reset, and On Error handling. It also has advanced programming features that allow machine level control of the Stack and Direct Page registers, variable allocation, automatic 64K RAM control, program ongin and even multiple origins. It can even have machine language code generated within a program that executes just like any other Basic program line.

FULL COMMAND SUPPORT & SPEED

CBASIC features well over 100 Basic Commands and Functions that fully support Disk, Tape, Printer and Screen 1/ O. It also supports ALL the High and Low Resolution Graphics, Sound, Play and String Operations available in Extended Color Basic, and all with 99.9% syntax compatibility.

CBASIC is FAST. Not only will CBASIC compiled programs execute 10 to 1000 times faster than Basic, but the time it takes to develop a CBASIC program versus writing a machine language program is much, much shorter. A machine language program that might take several months to write and debug could be created using CBASIC in a matter of days or hours, even for a well experienced machine language programmer. We had a report from a CBASIC user that claimed "a Basic program that used to take 3 hours to run, now runs in 7 to 8 minutes". Another user reported a program that took 1 to $1\frac{1}{2}$ hours to run in Basic, now runs in 5 to 6 minutes!!

MORE THAN JUST A COMPILER

CBASIC has its own completely integrated Basic Program Editor. The Editor contained in CBASIC is used to Create and/or Edit programs for the compiler. It is a full featured editor with functions designed specifically for writing and editing Basic programs. It has built-in block Move and Copy functions with automatic program renumbering. Complete, easy to use inserting, deleting, extending and overtyping of existing program lines. It is also used for Loading, Saving Appending [merging], Killing disk files and displaying a Disk Directory. It also has automatic line number generation for use when creating programs or inserting sequencial lines between existing lines. You can set the printer baud rate and direct normal or compiled listings to the printer for hard copy. The built-in editor makes program corrections and changes as easy as "falling off a log." If CBASIC finds an error when compiling, it points to the place in the program line where the error occurred. All you have to do is tell the editor what line you want to start editing and when it is displayed, move the cursor with the arrow keys to the place where the error is and correct it. Just like that, it's simple

HI-RES & 80 COLUMN DISPLAYS

CBASIC is the only Color Basic Compiler that includes its own Hi-Resolution 51, 64 or 85 by 24 line display. It is also the only compiler that supports both the PBJ "Word Pak" and the Double Density 80 column cards. All of these display formats are part of the standard CBASIC compiler package. Not only can these display formats be used for normal program editing and compiling, but CBASIC will also include them in your compiled programs if you want CBASIC to include the display driver in your program, all you have to do is use a single CBASIC command "HIRES". The run-time display driver that CBASIC includes in your program is not just a simple display, but a full-featured display package. With the Hi-Resolution display package you can mix text & graphics, change characters per line, underline, character highlight, erace to end of line or screen, home cursor, home & clear screen, protect screen lines, and much more. All commands are compatible with our Hi-RES II Screen Commander so you can easily develop screen layouts using Hi-RES and Color Basic before you compile your program. The same applies to using the 80 column card drivers. What other Basic compiler offers you this kind of flexibility?

64K RAM SUPPORT

CBASIC makes full use of the power and flexibility of the 6883 SAM (Synchronous Address Multiplexer) in the Color Computer It will fully utilize the 96K of address space available in the Color Computer 164K installed) during program Creation. Editing and Compilation. CBASIC has a special command for automatic 64K RAM control. When used in a program, it allows the user to use the upper 32K of RAM space automatically for variables or even program storage at run-time. It will automatically, switch the ROMs in and out when needed. There are also two other commands that allow you to control the upper 32K of RAM manually, under program control. No other Color Basic compiler directly supports the use of 64K RAM like CBASIC.

ALL MACHINE LANGUAGE

CBASIC is completely written in fast efficient Machine Language, not Basic, like some other Color Basic compilers Because of this, CBASIC can edit and compile very large programs. Even using the Hi-Resolution 51 by 24 line display, it can work with about a 34K program, and the 80 column card versions can handle almost 40K of program. Some of the other Basic compilers can only work with 16K or about 200 lines. Even working with large programs. CBASIC compiles programs with lightning fast speed. It will compile a 24K program to disk in less than 2 minutes! That's without a listing being generated. We've heard stories about some other compilers that take almost 10 minutes to compile a simple 2-3K program. You might inquire about this when you look at some of the other compilers available.

THE FINISHED PRODUCT

Since CBASIC contains statements to support ALL of the I/O devices (Disk, Tape. Screen & Printer). Hi-Res Graphics, Sound, and Enhanced Screen displays, it is well suited for a wide range of programming applications. It generates a complete, Ready to Run machine language program. The finished product or program does not have to be interfaced to a Basic program to perform some of its functions or commands. This may seem obvious to you, but some of the other Color Basic compilers don't necessarily work this way. Some of their compiler commands need a separate Basic program in order for them to work. In some cases, require that a separate Basic program be interfaced to the compiled program to perform I/O functions, like INPUT, PRINT and so on. CBASIC doesn't do this. ALL of its commands are compiled into a single machine language program that does not require any kind of Basic program to make it work.

COMPATIBILITY

You may be wondering about those statements we made earlier concerning 99% or 99.9% syntax compatibility. What does that other 1% consist of? The biggest part of that 1% has to do with string arrays and variables. CBASIC does not use a "String Pool" like Color Basic. If uses absolute memory addresses to locate string variables and arrays. This is why CBASIC's string processing is so fast, it also eliminates the time consuming "Garbage Collection" problem. When CBASIC allocates space for strings, it must know how much space to use for each element. To Dimension an array of 40 strings, of characters each, you would DIM DAS(40,64). If a string is not dimensioned, CBASIC will automatically allocate 32 butes for it. If you want a single string to have enough room for 200 characters you would DIM AXS(200). For string arrays, you would still access the element you want, the same as Color Basic, to get string #30 from the array DA\$, you would still use DA\$(30), the only real change is in the DIM statement. For undeclared string arrays of 10 elements or less. CBASIC will automatically reserve space for 10 (0.9) strings of 32 characters. In some other Color Basic compilers, you have to declare EVERY string variable used in the program in a DIM statement. And, to create an array of 40 strings with 4c characters asch, you would have to DIM AD\$(2560), and then to access string #30, you would have to multiply 30 × 64 and use a special variable name format or access it one character at a time. Not very compatible or convenient to use, and difficult at best.

CBASIC REQUIREMENTS

CBASIC requires a minimum of 32K RAM and at least one Disk drive. We strongly recommend that you have 64K. CBASIC is compatible with all versions of Color & Extended Basic and both Disk Basic V1 0 and V1 1. Programs compiled on either system will run on systems with different ROMs. CBASIC is NOT compatible with JDOS.

DOCUMENTATION

The Documentation provided with any program is very important to the user. This is especially true when you talk about a program as complete and complex as CBASIC. Even though CBASIC was designed to be the most User Friendly, compiler on the market, we went to great lengths to provide a manual that is not only easy to use and understand, but comprehensive and complete enough for even the most sophisticated user. The manual included with CBASIC consists of approximately 120 pages of real information, not like some manuals that put just one or two short paragraphs on a page. If we did it that way, we could have easily created a three or four hundred page manual. The manual index breaks down each section of the manual and gives a 3 or 4 word description of each section and its items along with page numbers. The manual has three sections, the Editor, Compiler and Appendix. Each of these is divided into subsections, with Section and Subsection titles in the section of the pages and scanning the Section titles on the top of the pages. The Manual itself is an 8½ by 11 Spiral Bound book with durable leather textured covers. Some of the reports we have had from CBASIC users describe the manual as being the Best program manual they have ever used.

COMPARE THE DIFFERENCE

CBASIC is not just another Color Basic Compiler. It is the only complete Basic Compiler System for the Color Computer Compare CBASIC's features to what other compilers offer and you'll see the difference. When comparing CBASIC to other compilers, you might want to keep some of these questions in mind. Does it support I/O functions? You can't write much of a program without PRINT, INPUT and so on. What about complex string statements, or string statements at all? How large of a program can you write? Can you compile a complex string like: MID\$RIGHT\$[DA\$(VAL(IN\$),LEN(LE\$)),3.39. Can you use two character variable names for string & numeric variables, like Basic. Does it support all the Hi-Res graphics statements including PLAY. DRAW, GET and PUT. using the same syntax as Basic? Do you ever have to use a separate Basic program? Can you take compilete Basic programs and compile them without extensive changes? Will they work? How do you edit a program when it has errors compiling?

PRICE VERSUS PERFORMANCE

The price of CBASIC is \$149.00. It is the most expensive Color Basic Compiler on the market, and well worth the investment. We spent over 2 years writing and refining CBASIC, to make it the Best, most Compatible Color Basic compiler available. Most of our CBASIC users already bought one or more of the other compilers on the market and have since discarded them. We even traded in a few of them. If you want a cheap compiler, we'll sell you one of those traded in, at a good price. Before you buy a compiler, compare the performance of CBASIC against any Color Basic compiler. Dollar for Dollar, CBASIC gives you more than any other Color Basic compiler available.

ORDERING INFORMATION

To order CBASIC by mail, send check or money order in the amount of \$149.00 plus \$3.00 for shipping and handling to the address listed below.

To order by VISA, MASTERCARD or COD, call us at: (702) 452-0632 (Monday thru Saturday, 8am to 5pm PST)

CER-COMP 5566 Ricochet Ave. Las Vegas, NV 89110 (702) 452-0632

Football Statistics Package **Keeps Thorough Stats**

Football Statistics Package is a well-written statistics program for those who want to keep records of their team and its opponents. It requires 32K, one disk drive and a printer. For those with only one drive, it will be necessary to switch from the program disk to the data disk when prompted. According to the author, the package is designed to track little league, high school, college or any level desired. It is not a league secretary but can be used for one if desired. It is primarily designed around one team, with individual, team and opponents stats.

Football is completely menu driven and very user friendly. Single key entries are used when possible, and there are many submenus to make things simple. An easyto-understand, nine-page documentation booklet is included to give you a general overview of the package.

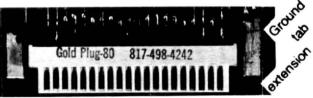
After running the boot program, you are asked to enter the number of drives and Baud rate of your system. The main menu program is used to move from item to item. When returning from a support program, you are returned to the main menu.

There are many features of this program that are too numerous to mention, but a few which appear on the documentation cover are: Mid-season entry, update and

> TRS-80+ MOD I, III, COCO, TI99/4a TIMEX 1000, OSBORNE, others

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additions; Correct and review all stats in file; Correction on all input screens; Raw dump of data to the printer - for the player and opposing team's files; Summary of the player and opposing team's stats; Track 90 individual player stats; Summarize 17 cumulative team stats; Summarize 28 cumulative opposing team stats; Team summaries of 87 stats; Comparative summary printouts 63 stats for your team; Comparative summary printouts 62 stats for opposing team; and over 350 total possible stats to record.

Included with Football are two disks: One is the system disk which includes all the support programs; the other is a sample data disk with 75 team members' stats recorded. I did start my own data disk and just used my imagination for all the individual player's statistics, but soon gave up as the task was very monotonous because of all the different statistics to be entered.

Finally, I decided to try number 11 from the main menu (RUN TEAM SUMMARY) using the provided data disk. The following was printed on the 21-page team summary: my score and the opposing team's scores in each quarter, the total score, penalties, penalty yards and first penalty. Then my team's roster was printed, which included each player's number, height, weight, year (or grade) and position played. Next, for each of the 11 opposing teams recorded, each of my player's and the opponent team name was printed, with the total quarters played and number of plays for each individual. This amounted to about 12 pages. After that, the passing stats for certain quarterbacks were printed, including passes attempted, passes completed, vards, intercept, first down and touchdowns.

To save space. I will only list the last six stat sections printed: Rushing stats, Receiver stats, Kickoff team, Kick receival team, Punting team and Punt receival team. The last two total sections were for defensive and opponent team stats.

There was a small problem with the PRINT/DAT program. CoCo gave me a syntax error in Line 170 when the program began to run. This was a result of a FILES 3 statement, in conjunction with my 1.0 disk ROM which has a few bugs. A simple fix for this is to type FILES 3 from the command mode before running Football.

Overall, I was impressed with the ease of use and wide variety of options and functions. If you are interested in keeping track of your favorite football team, and don't want to keep notebooks full of your sloppy writing, help our economy and purchase Football Statistics Package!

(Sugar Software, 1710 N. 50th Avenue, Hollywood, FL 33021, printer and 32K required, disk \$29.95)

- Darren Nye

See You AT **RAINBOWfest California** February 14-16

Sound Generator For The Sounds Of Your Life

Sound Generator is a program that allows the custom design of sounds. As the instructions explain, sound is a combination of sound waves and loudness. With this program you can enter any wave form desired. You are also allowed to enter the "sound envelope," which is simply the varying loudness of the sound. Either of these can be entered graphically or numerically.

To get started, the instructions tell you how to load in either of the two sets of wave and envelope tables recorded on the program tape. They then take you step by step through most of the commands available, showing you how to use them. The first command is to allow you to draw or view the table. The second will allow numeric entry of either table. There are commands to allow changes of pitch, number of envelopes to be played and cassette save and loads.

Others allow the listing of the table values to screen, delete current table from memory, stretch table, end program, shrink table and duplicate table values. Three of these need some explanation. The first, stretch table, takes the current table and duplicates each element, truncating the last half of the current table. Shrink table will delete every other element, leaving the last half of the table empty. The last, duplicate values, will take the portion of the table entered and repeat it until it reaches the maximum table length, allowing you to enter only part of a repeating table.

There is one other command which is excellent for sound synthesis. This command will allow you to create a machine language sound effects routine. The way it works is by prompting for the pitch and number of repetitions of each note to be played. It will then use the wave form and envelope tables to play each of the notes entered. This is great for playing songs.

If you are interested in sound synthesis I recommend Sound Generator. Although there seems to be an expectation of a previous knowlege of how sounds are generated, the instructions are helpful enough to get you started. From there you can experiment and learn what you didn't already know.

(Tothian Software, P.O. Box 663, Rimersburg, PA 16248, cassette \$19.95)

- Jim Sewell

See You At
RAINBOWfest Princeton
October 11-13

BASTXT Puts A Variety Of Options At Your Fingertips

By Dale Shell

If you do a lot of BASIC programming and you are getting tired of seeing the same old green and buff screen, Valley Micro Systems may have just come to your rescue with BASTXT. BASTXT was developed to enhance BASIC, adding 21 more commands and eight functions. It also adds high resolution text to the graphics screen. BASTXT requires 64K and at least one disk drive.

There are two text screen modes with BASTXT, 32 by 16 and 42 by 16. The 32-by-16 mode should allow most BASIC programs to run unmodified. The 42-by-16 mode is very handy, but remember when the PRINT® statement is used, it will not cover the entire screen. Mode 42 will also not allow any color or inverse highlighting commands to be used. Some of your BASIC programs may have to be modified, but this mode allows almost a third more information to be displayed on the screen.

Inverse highlighting is invoked using the INVERSE ON command. The INVERSE command can be used two ways. INVERSE can totally reverse the text and background colors. The second use, highlighting text, is very useful to call attention to special words on the screen.

Another way to bring attention to certain parts on the screen is to underline words. This can be done using the ULINE ON/OFF command. It can be used to underline any text printed on the screen. Once this feature is turned on, it will underline everything that goes to the screen until it is turned off, even if the program running is stopped.

BASTXT has many features to enhance the appearance of your screen. Smooth scrolling is available; with SMOOTH ON, the screen is scrolled up a pixel at a time instead of a line. This slows the scrolling down considerably. Another way to slow things down is with the SPEED command. This command changes the speed at which characters are printed to the screen. The default, SPEED 0, is the fastest, with SPEED 255 being the slowest—it really creeps along at a snail's pace. You can choose any speed in between.

BASTXT also has a PAGE command which causes the scrolling to pause every time the screen fills up. Two other commands allow you to tab to any horizontal or vertical position (i.e., XTAB and YTAB). A WINDOW command has also been included. This command allows you to protect from zero to 14 lines of text at the top of the screen from scrolling. You can still use PRINTes to get into the window, but the window is protected from commands like CLS and WCLS. WCLS is a fancy way of clearing the screen. It makes the screen sort of "dissolve" away. You can also disable the BREAK key with a simple command, BREAK ON/OFF.

There are three different cursors you can choose from, or you can edit and create your own. The three that come with BASTXT include an underline (nondefinable), a single block (single-character definable) and a man waving his arms (seven-character definable). A SCAN command is

The next four commands, BLACK, RED, BLUE and NORMAL, provide four different colors of printing. The NORMAL is close to BLUE but appears to be a different shade. All these can be used together and in conjunction with the INVERSE command; they can yield some interesting displays. INIT is used to put all the commands back to their default values and EXIT is used to disable BASTXT and return your system back to normal BASIC.

The eight functions available are comparable to assembly code instructions. I will not describe their functions but will list them. If you are familiar with machine language, then you will probably have a good idea of what they do. They are: COM(0-255), ARSL(0-255), LSL(0-255), ROL(0-255), EOR(0-65535,0-65535), ARSR(0-255), LSR(0-255) and ROR(0-255).

A program also comes on the disk which allows you to customize the defaults of BASTXT. It will also allow you to customize the cursor or any other character.

Valley Micro Systems has done a lot of work and they have developed a very useful product, but "every silver lining has its clouds," as they say. I tried to evaluate BASTXT's compatibility with as many DOSs as I could get my hands on. BASTXT appears to be fully compatible with KDOS and works fine if the DISABLE command is used with ADOS before booting the program. It would not work with JDOS version 1.11; a later version was not available. Of course, the Radio Shack DOSs worked fine. I didn't have other DOSs available to try.

Valley Micro Systems disabled the DOS command. It is stated that "this was done to facilitate compatibility with all ROM revisions." I use the DOS command on most of my diskettes from the PUTDOS article in RAINBOW,

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included to cause the computer to pause until a key is pressed. This seems the same as EXEC 44539.

November 1984 (Page 140). I wish they would put that command back.

Because the BACKUP command uses some of the graphics area of memory, you cannot use BACKUP with one singlesided disk drive. If you have two drives, or are using a double-sided drive as two singles, you can use BACKUP from one drive to another. You just cannot use the single drive backup. Also, when using BACKUP, the graphics/text screen will go "bonkers" and fill up with garbage. Don't worry, this is normal, just press the CLEAR key when the backup is finished.

One other good feature of BASTXT is the ability to enter BASIC commands in lowercase. However, if you want the program to print text in lowercase, you have to insert the text with the EDIT mode. You must also be careful not to enter a command in lowercase when in the EDIT mode or you will get the old SN Error.

Now for the bottom line. All considered, I believe BASTXT is a very useful and well-done program if you are aware of its limitations. They may concern you or they may not be limitations at all. If you do a lot of programming, you will enjoy the different options you will have at your fingertips. The WINDOW, ULINE, INVERSE (etc.) commands can provide some very impressive displays. But, if you give or sell your program to someone who does not have BASTXT and you use some of the effects and features of BASTXT, the person who gets the program will not be able to use it. You may want to contact VMS about including their program embedded in your own if you want to market it.

(Valley Micro Systems, 801 W. Roseburg Avenue, Suite 200, Modesto, CA 95350, disk \$34.95)

Hint . . .

Unpacking BASIC Programs

If you have come across a program that has had its lines packed so tightly that parts of the lines can't be seen when listed, here is a way to make them visible again in a 64K CoCo. First RUN a program, such as this one from Frank Hogg, to put the CoCo in its 64K model:

- 10 'ROMRAM
- 2Ø CLEAR999
- 3Ø DATA26,8Ø,19Ø,128,Ø,183,255,2
- 22,166,128
- 4Ø DATA183,255,223,167,31,14Ø,22
- 4,0,37,241,57
- 5Ø FORI=1TO21:READA:A\$=A\$+CHR\$(A
-):NEXTI
- 6Ø P=VARPTR(A\$)+1
- 7Ø POKEP, 126
- 8Ø EXEC P
- 90 PRINT"BASIC IS NOW IN RAM"

Then simply enter POKE &HBB16, 4. This poke into the BASIC interpreter will allow the full line to be listed. This POKE will affect the LIST, LLIST and ASCII save functions, but will not affect the EDIT mode.

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CoCo Echo Gets It All In Writing

I was just thinking the other day about how nice it would be to get a hard copy (a hard copy is a printed copy) of anything typed from the keyboard, so I was happy to receive CoCo Echo for review.

CoCo Echo is available from Tothian Software. There were two versions of this program on the cassette. The first version of this program, ECHOLO, is for use with 16K machines with or without Extended Color BASIC. The second version, ECHOHI, is for use with at least a 32K machine with or without a disk drive attached.

To use the program with a 16K Non-Extended BASIC machine, you will need to type POKE 359,126 and ENTER after you type CLOADM:EXEC: and ENTER. To turn the program off, you will need to type POKE 359,57 and ENTER.

To use the program with a 16K Extended BASIC machine, all you need to do is type CLDADM: EXEC: and ENTER, and you're ready to go. CoCo Echo will load into the first graphics page of memory. This is fine, though, because this program will print only text and not graphics.

After the program is loaded, you have to separate functions at your command. The first function is a screen dump. This will cause the contents of the text screen to be dumped to the printer. The text screen consists of 32 lines; it is the area from the top of your TV screen to the bottom of the screen. To use this function, you need to press the SHIFT and right-arrow keys at the same time.

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The second function of CoCo Echo will take whatever text is typed from the keyboard and send it to the printer. To use this function, you need to press the SHIFT and downarrow keys at the same time. You can end this duplicating process at any time by pressing the SHIFT and down-arrow keys a second time.

As I have a 16K Extended BASIC computer, I was only able to try out the first version of CoCo Echo. I was happy with the ease of operation. Although the instructions I received with the program were very short, I had no trouble getting it loaded and running.

Since I wanted to try out the 32K version of this program, I called my local Radio Shack store and explained what I wanted to do. When I got to the store, Don (the manager of the computer center), took me to a computer, set up the printer and let me go. With a 32K computer, you need to type CLEAR 200,32580 and ENTER before you type CLOADM: EXEC: and ENTER. This will load the program into the top of your computer's memory and out of your way. You use this program in the same way you use the 16K version. Once again, I had no trouble with the program operation.

Some of you might be asking yourselves, "Gee, it sounds like a good program, but what could I use if for?" Well, let's say you would like a directory of programs. No problem! If you have a disk drive, just type DIR, ENTER and you will get a hard copy of the directory. How about if you're typing in a BASIC program; just turn on the duplicating process and while you're writing your program, you'll be getting a hard copy of the listing at the same time. These are just two suggestions for the use of CoCo Echo. I'm sure if you buy it you will find more.

As you might have already guessed, I think CoCo Echo is a very useful program. I had no trouble at all getting it to work and it did everything it was supposed to do. If you have a need for this type program, I would recommend it.

(Tothian Software, P.O. Box 663, Rimersburg, PA 16248, \$9.95)

- John H. Appel

One-Liner Contest Winner . . .

Here's a One-Liner called Rug Weaver. It has 40 different patterns and can draw them in three colors for a total of 120 different "rugs." The program uses only two line statements, but the space between each line is the secret.

The listing:

Ø C=RND(4)+4:P=RND(1Ø)+5:PMODE3: PCLS:COLORRND(3)+1:SCREEN1,1:FOR Y=3ØTO16ØSTEPC:FORX=5ØTO21ØSTEPP :LINE(X+1Ø,Y+1Ø)-(X,Y),PSET:LINE -(X-1Ø,Y+1Ø),PSET:NEXTX,Y:FORT=1 TO3ØØØ:NEXT:GOTO'

>THE RUG WEAVER<>BY JIM COCKRUM<

Jim Cockrum Martinsville, IN

(For this winning one-liner contest entry, the author has been sent copies of both *The Rainbow Book Of Adventures* and its companion *Rainbow Adventures Tape.*)

Telepatch — An Excellent Enhancer For Telewriter

By John R. Curl

When I first got Telewriter-64 last year, I was in heaven. I couldn't believe the program's versatility and ease of use. I didn't have to study the manual and several other books for a month before I could start using it. I didn't have to remember complicated command strings. Most of my documents were less than six pages long. This was the word processor I had been looking for.

As time went on, though, I began making a mental wish list of things *Telewriter-64* didn't have that it needed. This list included key click, block move, key repeat, easier disk I/O and more. *Telewriter-64* was still the word processor for me; I just wished it had some little improvements.

Enter Spectrum Projects' Telepatch by Bob Van Der Poel. As the name implies, Telepatch is a Telewriter-64 enhancer. It adds all of the above improvements and more. After using it for a week, I can't believe Telewriter never had the enhancements that Telepatch provides.

Telepatch requires a 64K Color Computer with at least one disk drive. You must also have the disk version of Telewriter-64. Even with all of the enhancements, the basic functions of Telewriter-64 are still the same.

Installation of *Telepatch* is very simple. First, make a backup of your *Telewriter-64* and *Telepatch* diskettes.

(Never use your originals!) Next, format a blank diskette (known as the destination diskette). Insert the *Telepatch* diskette and type RUN "PATCHER" and press ENTER. After this, all you have to do is follow the prompts — it's as simple as that.

When finished, your new systems diskette should have the following programs on it: TW64/NEW, T/BAS, */
*** and TSPOOL/BAS. These four programs handle everything including disk I/O. TW64/BIN is the new patched TW64/BIN. T/BAS replaces U/BAS as the boot program. */*** is the new disk I/O routine replacing S/XXX, S/BIN and S/ASC. I'll discuss TSPOOL/BAS later in the review.

To boot your patched *Telewriter-64*, just type RUN "T" and press ENTER. You will be greeted by a new title screen. It states that *Telewriter-64* is "modified, improved and made better in many ways" (it's the truth). You won't notice anything different on the main menu or the format menu. However, the Disk I/O menu has been totally replaced.

The new features added to the editor are: True Block Move, Visible Carriage Returns, Key Beep, Key Repeat, Lowercase, Faster Cursor Movement and Overstrike Mode.

The new boot program is the best improvement. With regular *Telewriter-64*, I had to set all of the print parameters in the format menu before I could print a document. This aggravated me very much! With the new boot program, you can set almost all of these parameters beforehand and not have to worry about them. This is made possible because the boot program now uses the POKE command to set the parameters.

You can also determine whether or not the new features are on or off. All you have to do to change a parameter

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or to turn a feature on is use BASIC's EDIT command to change different values in the boot program. The manual explains the procedure and also gives the different values that you need.

The format menu's printing parameters that can be set are: page numbering, spacing, queue function, printer type, one-page function, where to put the page number, characters per line, upper margin, bottom margin, left margin, lines per page and printer Baud rate. As you can see, almost all of the format features can be set to any default value needed.

The editor features which can be set in the boot program include: editor screen's background color (green or buff), key click on or off, key click length, key click tone, key-repeat rate, repeat delay, shift-repeat delay, lowercase/uppercase toggle and overstrike/insert toggle.

There are also several disk I/O parameters that can be changed in the boot program. These are: verify on or off, default drive number, binary or ASCII I/O default and drive stepping rate (for those who have drives which can run faster than 30 ms).

While I'm on the subject of disk I/O, I will explain the features of the new disk I/O driver. With the original Telewriter-64 if you wanted to switch between binary and ASCII I/O, you had to exit the program and load either S/BIN or S/ASC and then save this as S/XXX. That's quite a hassle. With the new driver, */***, all you have to do to toggle between binary or ASCII I/O is press the 'I' key at the disk I/O menu. No more problems. When the "Kill" function is selected, you will be asked if you are sure you want to kill the file. You will also be asked

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if you are sure when you try to read in a file and there is already text in the buffer.

The program will also remember the last filename used. Thereafter, this will be the default filename for any I/O functions. If you would like to change the default filename, press the '@' key at the disk I/O menu. You will then be prompted for the new default filename. All other disk I/O funtions still operate the same.

I will now explain the TSPOOL/BAS program. In order to run this utility, you must exit to BASIC from the disk I/O menu, and type RUN "TSPOOL" and press ENTER. This utility program allows you to print a file to the disk instead of a printer. This means the file will be printed to disk in the exact same format as if you had printed it on paper: margins and spacing will be observed, centered text will be centered and pages will be numbered.

This enables you to print the file at a later time using a simple little BASIC program with the LINE INPUT command. You don't have to have *Telewriter-64* to print the file on a printer. Just OPEN the file on disk, LINE INPUT the text from the disk and then PRINT#-2, the text. You would have to actually use this feature to appreciate it.

The only limitations of this utility are that it will only work with files that have been saved in binary format and it will not work with files that have embedded 'Q' (queue) commands

Telepatch is an excellent program. It adds several outstanding features to Telewriter-64. In my opinion, whether you already own Telewriter-64 or are thinking of purchasing it, you must purchase Telepatch in order to get the most benefit from Telewriter-64.

(Spectrum Projects, Inc., P.O. Box 21272, 93-15 86th Drive, Woodhaven, NY 11421, \$19.95 plus \$3 S/H)

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RS232IO Allows Adaptation Of Compatible Peripherals

Why do you need an RS-232 I/O program? Well, we can start out by saying that the four-pin DIN connector on the back of your CoCo is not in itself a complete user port. Programs are often required to allow the use of this port to drive RS-232 compatible devices.

The software packages for the CoCo that make use of this port are usually dedicated to a specific hardware device such as graphics screen dump programs and telephone modems. But what if you want to control some special purpose device such as a robot? What software would you use?

RS23210 is a short (134 byte) machine language program which provides the CoCo programmer with the tools needed to run just about any peripheral from the CoCo port that is RS-232 compatible. The program is multi-saved on cassette tape and a nine-page instruction manual is supplied.

The software is not copy protected and backup copies for the original owner are easily made. The program can also be saved and executed from disk and is fully relocatable to any unused RAM area which can be protected with a CLEAR statement, or it can be stored in a graphics page without the need for a CLEAR statement.



While the documentation is thorough, it must be studied carefully. Several spelling errors were found, but did not prevent comprehension of the information. The author gives in detail how to load and make use of the software. As written, it provides one start bit, two stop bits and eight data bits to be either sent or received via the CoCo RS-232 Port.

After loading RS232IO, it is necessary to PDKE in five variables which control where in RAM the data for sending and/or receiving is stored. They are:

- Data In Count Counts each data byte received from one to 256.
- 2) Match Byte If the match byte is the same value as the received data, transmission stops. It can be turned on/off with a poke.
- Data In Address Tells the computer where in RAM to store the received data.
- 4) Data Out Address Tells the computer where in RAM to store the data to be sent.
- Data Out Count Counts each data byte sent from one to 65536.

By simply poking these addresses with this program in RAM, you are able to "customize" your RS-232 port. Receive and send Baud rates can also be changed. One word of caution, however: This is not a ready-to-run, menudriven program; rather, it allows the user to develop his/her own BASIC programs that call the RS232IO as a subroutine.

With RS232IO and some BASIC programming skills, the user can adapt many RS-232 compatible peripherals that do not offer companion software for the CoCo.

(Racine, 5220 Birmingham, Tacoma, WA 98409, \$30)

- Jerry Semones

Submitting Material To Rainbow

Contributions to THE RAINBOW are welcome from everyone. We like to run a variety of programs which will be useful/helpful/fun for other CoCo owners.

Program submissions must be on tape or disk and it is best to make several saves, at least one of them in ASCII format. We're sorry, but we do not have time to key in programs. All programs should be supported by some editorial commentary explaining how the program works. Generally, we're much more interested in how your submission works and runs than how you developed it. Programs should be learning experiences.

We do pay for submissions, based on a number of criteria. Those wishing remuneration should so state when making submissions.

For the benefit of those who wish more detailed information on making submissions, please send an SASE to: Submissions Editor, THE RAINBOW, The Falsoft Building, Prospect, KY 40059. We will send you some more comprehensive guidelines.

Please do not submit programs or articles currently submitted to another publication.

Nutriguide Lets CoCo Guide Calorie And Nutrition Intake

By J.B. Garner

Nutriguide, by Homesoft Company, is a fun program enabling the user to analyze meals or daily food intake in terms of 13 basic nutrients, ranging from calories to cholesterol. The program also enables you to keep a regular weight chart, advises on recommended calorie intake to maintain reasonable weight levels and indicates how your present eating style compares with recommended calorie, protein, fat and carbohydrate intake.

I am neither a dietician nor a nutritionist but, as a biostatistician, I have analyzed the data pertaining to several research projects in which daily nutritional intake was of critical importance. At present, one project is closely monitoring the sodium (salt) intake of patients with high blood pressure. Another researcher is attempting to prevent the re-formation of gall stones (after first chemically dissolving them) by recommending a diet relatively high in fiber and protein. All these studies have shown me the importance of our everyday diet to our state of health and how useful it is to monitor, in nutritional terms, our daily food intake.

Nutriguide comes on a disk together with an 18-page booklet. The disk contains several programs, including a very large food file, which are all run from a single program, *NUTRIENT*. The programs are written in BASIC, apart from the food file, and an attractive initial screen display which mixes text and Hi-Res graphics. The whole program is very disk interactive.

The booklet gives detailed, step-by-step instructions on how to use *Nutriguide* and how to use each program option. It contains the index of the 658 types of food in the food file and gives a useful summary of elementary nutritional information.

The author recommends making a separate disk copy for each person using *Nutriguide*, since the space remaining on a single-sided disk is limited. As I wanted to try out the program with my family, I copied it file by file onto a double-sided disk (J&M DOS) without problems. After entering RUN "NUTRIENT" and watching the Hi-Res display (which informs you the program is written for people between 25 and 50 years of age, between 56 and 70 inches in height for women, and 61 and 75 inches in height for men), you are presented with a menu of options: Set Up Personal File, Daily Nutrition Report, Examine Weight Record, Start New Weight Record, Recipe Evaluation, Food File Menu and End This Program.

The limitations by age and height affect only the recommendations included in the program; the breakdown of food intake into nutrient components remains informative to all users.

Selecting Option I, you are prompted to give your name, frame size, gender, height and activity level. The program then prints two weight values, between which your ideal weight is prescribed and a recommended range of daily

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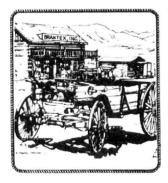
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calorie intake. All these values appeared very reasonable to me (as a layperson).

You then have the option to store this information to disk. The program does not give a file extension and so the disk ROM adds the default extension "/DAT," saving the file under the label NAME\$/DAT. The program next asks whether you wish to create a new weight record and creates a file containing the date and your weight. This time the program replaces NAME\$ by NAME\$ and "/WGT" and creates a file. Unfortunately, the program then fails to strip off the /WGT extension from NAMES and I had repeated FD Errors in Line 77 before I tracked down this small omission. A quick fix is to insert: NA\$ = LEFT\$(NA\$, LEN(NA\$) - 4) as the second to last statement in Line 193 of program NGUIDE/BAS.

The Daily Nutrion Report allows you to enter each food consumed during the day, item by item, by standard serving, ounce or gram, and then, at the close, lists the caloric, protein, fat, carbohydrate, calcium, iron, sodium, vitamin A, thiamine, riboflavin, niacin, vitamin C and cholesterol content of your meals. Probably, for most of us, this is a sufficiently long list, although other nutrients are of daily interest such as potassium (or the potassium/sodium ratio), fiber and alcohol. The program requests the date and your weight, then compares your intake with recommended intakes and predicts the future effect on your weight of continuing consumption in this manner.

The Recipe Evaluation option enables you to add additional items to the permanent food file. You enter each ingredient (and amount) of the recipe and the program analyzes it into its nutritional components just as described above, requests a definition of the amount of a standard serving and then (optionally) adds the recipe to the permanent food file. Very nice!

The constituent breakdown of any food item in the food file may be examined by using the Food File option. At present you cannot send this breakdown to the printer; hopefully this facility will be added in later versions.

Finally, by using the Examine Weight Record option you will see a Hi-Res plot of your weight values (up to 14 daily values) on a graph which also shows horizontal bars at ideal and various obese weights for people with gender and build similar to your own.

The author has tried very hard to construct an informative and entertaining nutrition program. The disk contains a great deal of nutritional information, and the programs interchange and run each other very nicely. Nutriguide runs fine with 32K and does not seem to require the advertised 64K. About 120 commercial foods and beverages, such as Burger King and Coca-Cola products, are included together with 540 basic foods in the food file. However, there are some surprising omissions: table salt, coffee, tea, ordinary (non-whole wheat) flour, meat drippings (for gravy) and fried eggs, for example.

In the review copy of the program there are still one or two rough edges, such as an occasional spelling error and an omission or two. Judging by the overall care taken with the program, I am sure these small difficulties will soon be solved.

If you have a general interest in your own nutrition, Nutriguide is a good program to buy!

(Homesoft, P.O. Box 8, Supply, NC 28462, \$29.95)

CoCo Calligrapher Captures Calligraphy's Penmanship

"What," you ask, "is a calligrapher?" Well, the phrase "Once upon a time" is a good beginning. Way back in the old days (well before CoCo) the world's scholars often wrote their manuscripts using a quill pen. A quill pen is a large feather with a hollow stem which was used to hold ink (and was often plucked from a large, unsuspecting bird). The beautiful penmanship that often resulted is known today as "calligraphy"; it is a skill learned with a great deal of practice.

Today's calligraphers use much more modern tools to practice their art. Special pens and inks allow unique and beautiful printed text. Most high school diplomas and college degrees are good examples of calligraphy as are formal invitations to weddings and graduations, and so forth

Now this attractive printing technique can be accomplished with your 32K Extended Color BASIC CoCo and a bit-image printer. Printers such as Epson, Gemini, several Radio Shack, Okidata 92, Banana and the Prowriter 8510 can be used. The resultant lettering on the printed page is approximately 36 point or ½-inch high letters which are variably spaced at an average of 13 upper- or 26 lowercase per line. The Epson, Gemini and Prowriter also provide the capability to center the text as well. These printers also allow the use of condensed letters which will double the number of characters per line. The maximum number of lines per message is 17.

The disk version supplied for this review worked beautifully. It contained three fonts: Old English, Gay Nineties and Cartoon. Each was tried with no problems. The program is menu driven and requires the type of printer

to be selected and the appropriate Baud rate to be set (600 Baud default).

After the printer is set up and online, the program will ask you to select any of the three supplied fonts or you can select a special font. While the instruction booklet does not state what these special fonts are, the advertisements appearing in RAINBOW do list quite a few optional fonts sold separately. The three that are supplied, however, are excellent and the results must be seen to be believed. I used the Old English fonts to make up several certificates for our church members; they were genuinely impressed and could not believe they were the result of a computer program!

A nice feature of the program is that automatic lowercase is selected during the menu option to print your message. This makes your keyboard respond like a typewriter in that you must press the SHIFT key to get a capital letter. If you prefer all uppercase, you can press SHIFT-0 as is done in BASIC. In any case, after the message is printed, the program will take you back to the main menu in uppercase for further selections or additional copies. Provisions are made to save the text onto tape or disk, depending on which version you have, and also to correct or change the text.

The four-page instruction booklet is complete, well-written and to the point. A 90-day exchange warranty is included and a procedure for making personal backup copies of the software is explained.

I liked CoCo Calligrapher. It offers many uses for the CoCo user and provides expansion capabilites through the use of optional fonts. So put away your quill pen and see how high-tech can be used to simulate an ancient art form.

(Sugar Software, 1710 North 50th Avenue, Hollywood, FL 33021, tape \$24.95, disk \$29.95 plus \$1.50 S/H)

Jerry Semones

SOFTWARE



Color Computer MACHINE MONITOR - professional software and manuals published by R.C.I. EDIT memory Content, TRACE program Instructions, TRAP data References, 3 display Formats. Program distribution includes both [2K] CoCo-dependent and [4K] stand-alone Versions. #10101/Tape = \$14.45, #10102/Disk = \$16.95; User Guide #20101/Small manual = \$9.95

HARDWARE



Color Computer PCBoards, FR4, [4x8]", 40 Pin, gold plated Connectors, design by R.C.I. #30101/A Bus Extender, cartridge Slot width (4.25"), 40 parallel signal Lines = \$14.00 #30102/A Prototype "P", [3.5X6]" grid, .042" PTH, .1" spacing, 34 pin Connector = \$20.00 #30103/A Prototype "L", 5.8" Rows for .3/.6"DIPs, .042" PTH, 34 pin Connector = \$20.00

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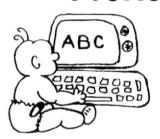


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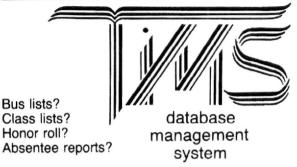
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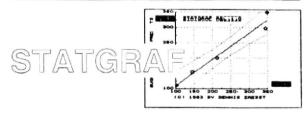
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HARDCOPY

A Five-Star Choice For A Printer Utility

By Larry Birkenfeld

Having a hard time getting that beautifully artistic creation off the disk and into a more tangible form for others to admire? Never fear, HARDCOPY is here. It is such a great printer utility it will make you want to hire an artist just to create pictures to print. HARDCOPY was written by Eric White and Scott Smith and is distributed by Computize, Inc.

HARDCOPY requires a 64K CoCo or CoCo 2, one disk drive and a printer to match the version you buy. At the time of this writing, the only printers supported are the Epson MX-80/100, RX-80 and FX-80, the I.D.S. 560-G and the Okidata 92. Support for other printers is supposedly on the way. Since each version supports only one printer, you must be sure to order the one that matches your printer. I reviewed the MX-80 version and it ran like a dream. Needless to say, I was very impressed.

The package comes with a single diskette and a nicely printed 27-page manual. The manual is well-organized, nicely illustrated (by *HARDCOPY* no doubt) and is quite sufficient.

HARDCOPY itself is capable of using four disks. They are 1) the HARDCOPY disk, 2) Graphicom Part II user fonts, 3) Graphicom format picture disks and 4) any disk containing a Hi-Res picture in binary format, including those saved from CoCo Max using the SCREEN.BIN file. I tested using the sample files on the HARDCOPY disk and a small picture made with Graphicom; all worked fine. Each picture processed is 6144 bytes long. The manual states that only 6144 byte images from CoCo Max can be processed, however, Bruce, at Computize, has informed me that this is no longer true. If you have CoCo Max and are interested in HARDCOPY, you might discuss this with him

Before booting the program there are three parameters in the boot file that may be changed if you so desire. The parameters and their default settings are as follows:

- Self-centering or non self-centering joysticks: default, self-centering.
- 2) Printer Baud rate: default, 9600 Baud.
- 3) Character set: default, ASCII/SET (Graphicom Part II fonts may be used).

After booting you will be requested to press Reset until the screen corner appears red. After this, pressing any key will bring up the main menu. At this point, pressing the space bar selects the keyboard as the main input device, while pressing the joystick firebutton selects the joystick as the main input device. Once selected, the input device may be changed while on any menu screen by pressing either the space bar or the joystick firebutton.

Once the main menu has appeared you see eight possible choices:

- 1) 1 x 1 print (1/4 page)
- 2) 2 x 2 print (½ page)
- 3) 3 x 3 print (full page)
- 4) Label print
- 5) Card Shop
- 6) Poster
- 7) Special Effects
- 8) Disk Access

Each selection is represented by a picture on the screen. Your choice is made by placing a movable square around the picture representing the desired option and pressing the firebutton (I selected the joystick as my input device for this review).

The first three main menu options produce identical submenus. You may 1) return to main menu; 2) look at the screen; 3) change PMDDE; 4) select color or black-and-white print; 5) choose a positive print; 6) choose a negative print. Since multiple printer dots are required to provide shades of gray for color prints, the color option is not functional on a 1 x 1 print.

The Special Effects option lets you define two shades of gray, rotate your print, choose only a portion of a picture to print by using a variable window, change the size of a pixel in the 'x' and/or 'y' direction, adjust the space between pixels, make the space between pixels either black or white, and produce mirror images. If all this doesn't impress you, nothing will. These features make HARD-COPY a very versatile printer utility.

The Label print option has all the features of the first three options. The "color or B & W" feature has been replaced with a "# of labels" feature. Once a print type is selected, a label size window appears over the picture for you to select which portion of the picture to print on the label.

The Card Shop option lets you take a picture, add text above or below it (you choose the text size), create text for the inside of the card and print all of this on one sheet of paper in such a fashion so as to be able to fold the sheet into a greeting card, complete with your picture and text.

The Poster option allows you to take a picture, or part of a picture, and enlarge it into a poster. It is made of several 8½ by 11-inch pages and must be put together to form a complete picture. You may choose your own scale factor. A word of caution is in order here: A large scale factor produces many output pages. This may overheat your printer head, so it is best to consult your printer manual before printing posters.

Last but not least is the Disk Access option. Naturally, this allows you to load the picture you wish to work with. You may also view a directory or view each picture on the disk one at a time.

For those who would like to print pictures from your own BASIC routines, *HARDCOPY* provides a "usercall" file and complete instructions for passing all required parameters through the BASIC routine to the usercall routine.

HARDCOPY is an excellent product that gives excellent results. If you're looking for a printer utility, it is a five-star choice.

(Computize, P.O. Box 207, Langhorne, PA 19047, disk \$29.95)

Color Computer Machine Monitor Gets The Job Done

Serious programming in assembly language requires a good editor/assembler, a monitor, possibly a disassembler and other software devices. Minor patching or debugging of assembler programs requires only a monitor, which is a machine language program to observe (or "monitor") changes in RAM caused by the assembler program one is debugging.

The standard for assembler-support software programs is Radio Shack's EDTASM+ because not only is it easily available and low in price, but it is the most frequently used assembler for CoCo ML programs. Considering that a monitor program represents only a portion of the EDTASM+ package, this implies that a monitor program, to be competitive, must sell for about 40 percent of the EDTASM+ price and ought to be more user friendly. RCI's Color Computer Machine Monitor (or CCMM for short) easily meets these requirements.

What must one have in a monitor? To begin with, its primary purpose is to observe the contents of both RAM and the CPU registers as the values vary during program operation. The monitor must be capable of conveniently inserting break points into the ML program being debugged, and displaying the values of memory and registers when these break points are encountered.

The ability to remove the break points is as important as the ability to set them. One must be able to begin execution at any location (to simulate unusual entries or unexpected branching) and also limit execution to a short enough series of commands for the user to understand what happened. In addition, the ability to list the data to a printer must be present.

A good monitor must also include a FILL command. This is used to load large pieces of memory with a user-defined hexadecimal value whose change will be readily apparent. A COPY or MOVE command must be available to relocate subroutines. All of the commands should ideally be single keystroke and the monitor must be written in relocatable code so it can be loaded where it will not

One-Liner Contest Winner . . .

This One-Liner demonstrates the CoCo's PLAY command by playing the theme from Raiders of the Lost Ark. Try a tempo value of '5' for best results.

Ø CLS:PRINT"RAIDERS OF THE LOST ARK THEME...":INPUT"TEMPO";I:PL\$ ="02T=I;L4GG#A#03L2D#02L3.FGL2G# ":PA\$="P255L402B-03CDL2G#P255L4. 03CP255DP255D#P255P255FP1ØØL2G": PY\$="02L5B-B-B-03L4GF02L5B-B-B-0 3L4GL2FP1ØØ01L9E-03E-04E-05E-":P LAYPL\$+PA\$:PLAYPL\$+PY\$:GOTO

> Donny Schiavone Tulsa, OK

(For this winning one-liner entry, the author has been sent copies of *The Rainbow Book Of Simulations* and its companion *Rainbow Simulations*

interfere with the program being debugged. Other features are nice, but these mentioned are the "bare bones" monitor requirements. RCI's CCMM includes all these monitor options.

Ideally, the monitor should be small (so as to leave a lot of memory for the programs being worked on) and be self-protective. RCI's monitor comes in two versions in one package and is small enough that it might even work in the older 4K models. The documentation is not too clear on whether 4K operation is feasible, but this program will work properly in 16K models that do not have Extended Color BASIC. That point may be very important to some users.

Unfortunately, the RCI monitor got poor marks from me on self-protection; I could crash it quite easily and it usually required a cold start (with loss of the program under development) to get going again. In addition, the keyboard sensitivity with CCMM running changes, which made me uncomfortable. The documentation, while neatly printed, conveniently arranged and comprehensive, is unintelligible. (I'm an MIT engineer and 25-year computer user, and I often could not understand this author.)

I must give RCI's effort only a second-place rating. Still, what is user friendly to me may be the opposite to you, and *Color Computer Machine Monitor* may be well-suited for your particular assembly needs.

(Real Computers and Intelligence, P.O. Box 74, Santa Clara, CA 95050, tape \$24.40, disk \$26.90)

- H. Larry Elman

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OS-9 Hi-Res Screen Dump Utilities For Quality Printouts

Tandy has released a new product in the OS-9 line, a Hi-Res screen dump package called OS-9 Hi-Res Screen Dump Utilities. The programs come neatly packaged in a 7 by 11-inch book-like container including the instruction booklet, program diskette and software registration information. This information will allow the owner to receive updates to the programs. Enclosed with the registration card is a software version log to help avoid any confusion with later patches or problems.

OS-9 Hi-Res Screen Dump Utilities comes in two versions, both requiring 64K. One for Tandy (or compatible) dot matrix printers and the other for the inkjet printer and its color capability. These programs will allow the user several options, the first of which is to print whatever is on the graphics screen to the printer. This mode has several options I will discuss later.

It is also possible to print a picture file to the printer. The third mode is one I found rather interesting. It will allow the graphics screen or picture file to be sent to disk. This is not so great in itself, but all it takes to print the file later is to LIST <pathname>>/p. Why is this so great you ask? If the picture has been dumped to the disk in this manner, it will be much easier to make multiple printouts of it.

E.T.T. Electronic Typing Teacher by CHERRYSoft

Learning to type the right way can save you hours of tedious work when entering programs into your CoCo, and this is just what ETT was designed to do. Devote a little time every day practicing with ETT and before you know it you will be typing with confidence. Entering those programs will no longer be the chore it use to be.

ETT's video keyboard lets you practice with all the keys labeled, all the keys blank or only the "home" keys labeled. The visual cues guide you while you learn to type without watching your fingers. ETT shows your accuracy, response time, and words per minute. You will quickly see that you are improving with practice.

With the sentences provided by ETT learning to type can be fun. Over 1000 variations chosen because they include every letter in the alphabet. You can also create your own practice sets. This outstanding program was written by a certified teacher and professional programmer and comes with a ten page student manual-study guide. Requires 16K Extended Basic.

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Each of the programs has its own set of options to allow the user to customize the dump. The black-and-white program has three options: 'I', 'C' and '7'. Very simply, these stand for Inverse (swap black and white), Condensed and LP VII(7) mode. If the LP VII or DMP-100 is used, the '7' option must be used to accommodate those printers. Also, the Condensed mode will not work on either of these two printers.

The color dump program has 10 different options, each specifying a different color set. The first six determine which set of four colors are to be used and the last four are for setting the two-color modes. When using the two-color modes, the horizontal resolution is 256; the four-color modes each have a horizontal resolution of 128. The two-color modes consist of combinations of black, white and green, while each of the four-color modes consist of combinations of the colors available in Extended Color BASIC.

These utility programs are very well-packaged, sufficiently documented and extremely easy to use. The disk is not in any way protected which allows easy backups for archival purposes. One thing I would like to have seen in the documentation is a procedure that could be used to save a section of graphics memory to a picture file.

A drawback to these programs is that if the user has the Hi-Res (O*PAK) program installed and calls up either of the programs to dump that screen, the screen is cleared and the program's logo is printed on the screen. This results in loss of the information on the Hi-Res screen and print out of the screen dump program's banner — a major problem. The only way around that is to save the screen to disk and then print it in that manner, which once again demonstrates the need for a discussion of saving graphics screens to disk.

If you use the Hi-Res graphics capabilities of OS-9 and wish to have a printout of your Hi-Res screens, I would highly recommend this package to you.

(Radio Shack stores nationwide, 64K OS-9, disk \$14.95)

- Mark Anderson

One-Liner Contest Winner . . .

Dotbounce shows a dot bouncing around the screen. When it hits the edge of the active screen area, you'll hear a random tone; the dot will change direction and speed randomly.

The listing:

Ø CLSØ:W=1:Z=1:X=Ø:Y=Ø:PLAY"L8Ø"
:FORA=1TO2STEPØ:IFX+W>63THENW=-1
-W:PLAY"O3C":NEXTA:ELSEIFX+W<ØTH
ENW=-1-W:PLAY"O3E":NEXTA:ELSEIFY
+Z>31THENZ=-1-Z:PLAY"O3G":NEXTA:
ELSEIFY+Z<ØTHENZ=-1-Z:PLAY"O4C":
NEXTA:ELSESET(X+W,Y+Z,5):RESET(X,Y):X=X+W:Y=Y+Z:NEXTA</pre>

Steven Ostrom Minnetonka, MN

(For this winning one-liner contest entry, the author has been sent copies of both *The Rainbow Book Of Simulations* and its companion *Rainbow Simulations Tape*.)

Professor Pressnote's Music Machine Makes Perfect Practice

Anyone who has gone through the experience of music training with their children on an instrument can appreciate a program that makes note recognition a lot simpler.

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As noted earlier, Professor Pressnote's Music Machine is a fun experience. But I would suggest or caution that it is only for families who are serious about music education—primarily because of the expense involved in two separate purchases, and you should also be prepared for hours of serious study. Don't expect to sit down and start playing such traditional children's favorites as "Mary Had A Little Lamb" or "Twinkle, Twinkle Little Star" right away.

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- Charles Springer



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41,725 35,600	Erik Habres, Bordentown, NJ Chris Morris, Colonial Heights, VA
18,300	Baiju Shah, Deep River, Ontario
ATOM (Radio	
53	★Alan Drazen, Longwood, FL
41	Erik Huffman, Rochester, MI
BASEBALL (F	
525-50	*Bob Dewitt, Blue Island, IL
24,600	UG\$ (THE RAINBOW) ★Michael Rosenberg, Prestonburg, KY
	(Spectral Associates)
577,330	★Bart Lyon, Queensland, Australia
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79	*Jeff Roberg, Winfield, KS
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115	★Bette Hatcher, Norwalk, CA
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186,700	★Pierre-Jean Douillard, Granby,
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101,476
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472,667 *Jim Herbers, Placentia, CA

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82 600

48,900

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— Debbie Hartley

Eric Gadlage, Jasper, IN James Mancari, Ravenswood, WV

Douglas Ervine, Burlington, IA Cory McKay, Montreal, Quebec Steve Black, Palmdale, CA

Steve Fell, Oshkosh, WI

SCOREBOARD POINTERS

In conjunction with THE RAINBOW's Scoreboard, we offer this column of pointers for our game-playing readers' benefit. If you have some interesting hints and tips, we encourage you to share them by sending them to the Scoreboard, c/o THE RAINBOW.

CAN'T GET NO SATISFACTION

Scoreboard:

Do you think you can increase the amount of "Scoreboard Pointers," giving a wider variety of help?

Also, how about having more "Scoreboard" records?

Thanks a lot.

Mike Rebbecchi Somerdale, NJ

Editor's Note: The more pointers we get, Mike, the more we're likely to print. C'mon, Scoreboarders, share those secrets.

POPPING THE RIVETS

Scoreboard:

For those having trouble "popping the rivets" on The King, here's a trick to solve it. When you have popped all the rivets on the left column, get the hammer in the middle and hit as many fireballs as you can. After each fireball is hit, run to the right until the girl on top faces the right. This sends all the fireballs entering the board to the left, where they are trapped. After you hit as many as possible, run to the top right rivet. When you pop the rivet, center your joystick and press the jump button as soon as your man is going to fall. While you are falling, you're also popping the rivets.

Brian Peters Philadelphia, PA

FRAGILE - HANDLE WITH CARE

Scoreboard:

I have a couple of tips concerning Radio Shack's Pyramid.

1) For those having problems setting down the vase, you must get the velvet pillow from the high priest's room. After you have that, get the vase and type RELEASE VASE and it is set safely on top of the velvet pillow.

2) After about 290-310 turns, your lamp starts to run out. You can prevent this by checking your score every once in a while, arcade-type games. There are no dues or

and by getting the extra batteries from the vending machine - if you have the gold

3) There's a very quick and easy passage to the entrance of the pyramid. When you get to the area where there is a panel on the wall, type PANEL and you will be at the entrance of the pyramid. To get back just type PANEL again. This makes it easy for you to drop your treasures at the entrance without wasting your turns.

David Hart Salt Lake City, UT

Scoreboard: In response to Judd Rossman's letter (June 1985) concerning Black Sanctum, you must drop the ash (DROP ASH) and type in a weird message on a certain piece of paper that now might be a statue!

I need help with Madness and the Minotaur, Sands of Egypt, Dungeons of Daggorath and Dallas Quest. Any clues or suggestions would be helpful.

Steve Warrick Peru, IL

BRIDGE THE GAP

Scoreboard:

In response to Ian Loeppky's letter (July 1985), the only thing you need the scepter for is if you want to make a bridge over the bottomless pit. You do not need the scepter for the bird! If you have the scepter while trying to get the bird, it flies away; you must first drop the scepter.

Any way you can, type GO PANEL where you drop the treasures and then you will be in the same hallway.

James Mancari Ravenswood, WV

COCO GAME CLUB OFFER

Scoreboard:

I'd like to know if any of your readers would be interested in joining a "CoCo Game Club" for both Adventure and

~*********************

fees. This will be mainly an information club so we can help each other solve games, as well as meeting new CoCo owners and hearing of their Adventures - through letters and possibly even phone calls.

If any of you are interested, please send one 22 cent stamp to P.O. Box 1308, 90651-1308. I think a club for CoCo game lovers

would be great! Thank you.

Bette A. Hatcher Norwalk, CA

Scoreboard:

I have solved Calixto Island and I have some hints. The treasure is in the clearing with the idol. Dig twice, get everything in the house and load it in the machine. When you get to the field, unload and put the stuff in the shed. The manual for the machine is in the chest. Trader Jack will only trade the keys and machete for the rug and chest. (The keys open the desk.) Give the natives the costume jewelry.

I also have a few questions. How do you read the microfilm? What's in the pottery

and what are the specs for?

Charles Farris Shinveld, the Netherlands

OLYMPIC QUEST

Scoreboard:

Is there an Olympic game on disk for the Color Computer?

Jon Sowle Vero Beach, FL

Editor's Note: I received the following letter, Jon, several days after your letter. Read on.

Scoreboard:

I would like to inform your readers that there will soon be an Olympic Decathalon game out for the 64K Extended Color Computer. For more information send an SASE to R & A Enterprises, 48 North View Ave., 02920.

Richard Russillo Cranston, RI

ALMOST A SOLUTION

Scoreboard:

I would like to respond to Tony Cross' letter (August 1985) concerning Trekboer. In the interest of "true Adventuring," I can't simply reveal the final portion of the game. but I can give a few hints.

In the underground complex on the garden planet, there is a steel grate. This grate is made of the same metal as the access panels of the "Trekboer" and "Veldboer."

Once past the grate, don't disregard any garbage you may find — it could bridge the gap between a hopeless situation and victory. Be sure, though, that you've left a line of escape or you may be left dangling.

George Caleodis Steubenville, OH

door and jump. This will advance you several levels and give you some bonus points and an extra life. If you play long enough, you can get the bonus up extremely high (i.e., 490,000).

Jeff, Kevin, Eric and Jay Roberg Winfield, KS

Scoreboard:

has, but four buggies sure go quick. Try changing the value of NS in Line 0 to a higher number for more buggies.

Martinsville, IN

Scoreboard:

I'm having a lot of trouble staying alive in Beyond the Cimeeon Moon. Does anyone have hints on how to get through safely or other helpful tips?

> Tex Kertesz Mesa, AZ

Wow! What excellent graphics Amphibia

Jim Cockrum

Scoreboard:

In Raaka-Tu, everyone says "get the poisonous candle to kill the gargovle." This may be a dumb question, but where's the poisonous candle?

> Chris Allbritton Little Rock, AR

DEFEATING THE DROIDS

Scoreboard:

I have solved Major Istar. For those who have this Adventure, take heart. Getting past the security droids can be frustrating, but it isn't difficult. There are two sections of security droids to run through. The second set of droids is faster than the first and their paths are slightly different.

As in other Adventure games, you will have to backtrack in order to obtain the necessary items.

Lastly, you must remember the importance of computers.

> Karen L. Jessen Cleveland, OH

Scoreboard:

In conjunction with Mike French's letter (July 1985) concerning Dungeons of Daggorath, instead of just putting one item in front of you, try putting a whole bunch of stuff. This way you can really get ahead of the monsters.

> Chris Morris Colonial Heights, VA

INCREASING YOUR SCORE

Scoreboard:

In Crystle Castles there is a way to achieve very high scores. On the first level, there is occasionally an extra door. Go in this

DALLAS TIPS

Scoreboard:

I have solved Dallas Quest and here are some hints you may find useful.

There are several objects in this Adventure that are useless. These include the apples, the rope and the suspenders.

When you get to the crossroads, go to the "Nest Egg." Remember to get the coconuts. When you get there, bribe the monkey with the tobacco and get the eggs.

After you go back to the tribe, show the monkey the mirror, and to escape from the natives WAVE the RING. When you get to the spider, type HATCH EGGS.

You also wave the ring to get by the elephant. To get by the lion, show him the mirror, too. I'll leave the rest of the Adventure for you to solve.

I am stumped with Trekboer. When I enter the underground complex I give the spider the yellow capsule. But when I get to the grating, there is another spider there! What am I supposed to do?

Keith Schuler Merritt Island, FL Scoreboard:

I would like to know why the pokes for Tom Mix's The King, in April 1985 by Jim Mathues, and in March 1985 by Bill Bernico do not work on my game. If anyone knows why, write to "Scoreboard Pointers."

Chad Parker Battle Creek, MI

BAREFOOTIN'

Scoreboard:

I need help on Shenanigans. Where do I get the shoes? I can find the clothes, but not the shoes. The bartender just kicks me

> Mike Kennedy Terrace Park, OH

Editor's Note: Look under the bed.

Scoreboard:

I have a tip for anybody who owns Raaka-Tu. When you have collected all your treasure, try to MOVE the ALTAR.

In Madness and the Minotaur when your lamp gets dim, find the urn and FILL LAMP.

In Bedlam, try to get the green key with the hook when you are one room away from

In Dallas Quest, use the shovel as an oar. John Perepchuk Blairstown, NJ To respond to other readers' inquiries and requests for assistance, reply to Scoreboard Pointers, c/o THE RAINBOW, P.O. Box 385, Prospect, KY 40059. We will immediately forward your letter to the original respondent and, just as importantly, we'll share your reply with all Scoreboard readers in an upcoming issue.

- Debbie Hartley

CORRECTIONS

"Brotan the Blue" (August 1985, Page 18): Alan Saporta tells us there are three changes that need to be made to his program. Change lines 32 and 34 to read as follows:

32 PUT(S,F)-(S+8,Y+11),SP:IFSC>2 ØØØ AND SC<2Ø5Ø AND GY<1Ø THEN G Y=GY+1 ELSE IF SC>5ØØØ AND SC<5Ø 5Ø AND GY<1Ø THENGY=GY+1

34 PUT(CD,Y)-(CD+8,Y+11),SP:IFSC <15ØØØ OR ED=1Ø THEN36 ELSE IF R P=1 AND ED<>1Ø THEN GOTO35

Also, add :ED=10 to the end of Line 35.

"Say 'Hello' To This Directory Helper" (August 1985, Page 69): Doug Heyza tells us that a minor bug in his program can be fixed by adding this line:

895 P\$(N)=""

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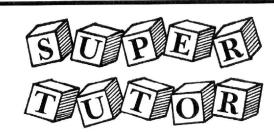
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"The Eye Saver" (July 1985, Page 124): Norman Wong says at least one reader has had a problem in Line 80 because a space was left out. Line 80 (which is correct as shown in the magazine) should have a space between IFSM< >K and THEN.

"Operation Freedom" (August 1985, Page 54): Linda Hartman called to tell us there is a problem with lines 20000 and 20040 (shown on Page 68). The end of Line 20040, which was supposed to be at the very bottom of the left column, ended up within Line 20000 instead. Here are the two lines in their correct form:

2ØØØØ C\$=CHR\$(128):PMODE1,1:PCLS 3:SCREEN1, Ø:COLOR2, 3:DRAW"BMØ, 12 ØC4R4L2M8,99R66M8Ø,12ØR2L4BM75,9 9E8U12H8L66G8D12F8": PAINT (36,88) ,4,4:PSET(2Ø,18Ø,2):DRAW"BM16,18 3C2F2R4E2M2Ø,187G2D2BM23,19ØU2": GET(16,18Ø)-(24,19Ø), IK:LINE(16, 18Ø) - (24,19Ø), PRESET, BF

2ØØ4Ø NEXTZ:PUT(4Ø,111)-(5Ø,12Ø) , IK: LINE (40,99) - (50,120), PSET, BF :FORT=5ØTO1ØØSTEP1Ø:PLAY"T"+STR\$ (T) + "ABABABA": NEXTT: LINE (5Ø, 12Ø) -(4Ø,99), PRESET, BF: NEXTX 9



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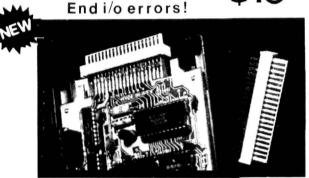
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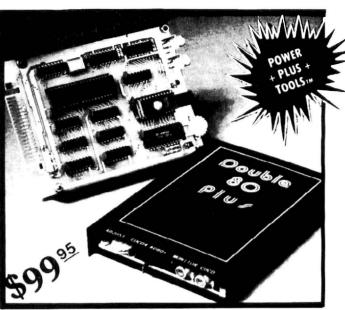
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DOWNLOADS

Stick With RS Drives — Or Go To Third Party?

By Dan Downard Rainbow Technical Editor

• I have a 16K Extended BASIC CoCo 2. I hope to expand to disk and 64K in the near future. Would it be better to stick with the Radio Shack drives and DOS or buy JDOS? Also, when I PUKE25,6: NEW I get my 14K back, but when I PUKE 25,0: NEW I get 16K when I ?MEM. Where does this extra 2K come from?

Rod Snaith Nipawin, Saskatchewan

Rod, the type of drives you buy is relatively independent of the DOS you use. The use of Tandy drives does not preclude the use of a J&M controller and vice versa, you can use a Tandy controller with, let's say, TEAC drives.

The main difference is in the DOS. Tandy has a copyright on Disk Extended Color BASIC. In order to provide a compatible system with their controllers, J&M wrote JDOS. It is compatible with BASIC, but not machine language. Since many programs use direct ROM calls, these calls have different addresses for the two different

(Dan Downard is an electrical engineer and has been involved in electronics for 25 years through ham radio [K4KWT]. His interest in computers began about six years ago and he has built several 68XX systems.)

systems. Realistically, you have the same potential problem in choosing between Disk BASIC 1.0 and 1.1.

Enter ADOS. ADOS is actually an extension of Disk BASIC; it adds commands. These DOSs are compatible with Disk BASIC and quite a few users are sold on these systems.

As I have said before, the J&M controller is a little more reliable than the Tandy controller from an electrical and mechanical standpoint. Both serve the same purpose—to interface your CoCo to the disk drives. The latest J&M controller allows the use of two ROMs. This solves your problem in DOS compatibility, and you get a parallel printer interface to boot.

I don't think you can go wrong with any combination of controllers and disk drives you buy, but I recommend using a Disk BASIC ROM. All of the pros and cons have not been mentioned, but I bet if you ask 10 different CoCo owners, you will get 10 different opinions. I suggest reading "Getting On The Right Track" by Colin Stearman in the July 1985 RAINBOW (Page 26).

Enough about disk drives, Rod. To answer your other question: Memory locations 25 and 26 tell BASIC where to start the program. If you POKE 25,6 your program will start at \$600, just above the text screen. If you POKE 25,0 your program will start at \$0 and wipe out all of the RAM

variables stored at these locations. If you don't plan on using graphics, POKE 25.6 will give you the maximum amount of usable memory for a non-disk system.

BASIC/ML Combo

• I would appreciate any information about the locations 360 and 361, which I use to make a nice combination between BASIC and machine language. These addresses are the most and least significant bytes that indicate the start address of my ML routine, which permanently executes itself, even in BASIC. I found this useful tip in the May 1984 RAINBOW, Page 149.

Normand Defayette Hull, Quebec

When Microsoft wrote the BASIC interpreter for Tandy, Normand, they made the ROMs expandable by adding RAM hooks into the ROM routines. Locations 360 and 361 are an address hook that allows the use of BASIC, Extended BASIC or Disk BASIC ROMs for console output. Otherwise, depending on the ROM you have in the system, this address will change to point to the proper routine.

By changing this address to the start of a program, after loading the program it will automatically execute. Actually, the microprocessor is going to output something to the screen, but after all, microprocessors are not as smart as the people using them, are they?

Type Trouble?

● I am writing a program that uses disk I/O from machine language. I noticed in the December 1983 RAINBOW on Page 329, there is a ROM subroutine for the L□ADM command at \$CEE5. I have tried to use this subroutine, but I cannot get it to work. I set the filename in \$94C (see Page 325 of that issue) and the file type in \$957. Are there more parameters to set? What is the problem? Help!

Also, at \$C8A4 (on Page 329) it says the filename should be set into \$957, which is listed as the file type, not the filename. Is this a typographical error or what? Also, \$EB is to be set with the default drive number, but is listed on Page 324 as being in the middle of the PLAY command section. Is this a typographical error, too?

Kevin Roberts Fairview, OK

The first thing to be clarified, Kevin, is that this address is only valid for Disk BASIC 1.0. The corresponding address for Disk BASIC 1.1 is \$CFC1.

These entry points assume a LOADM command has been encountered in a BASIC line and scan the rest of the BASIC buffer for the filename, extension and offset. You don't want to use these entry points for a machine language program.

Actually, it is a little complicated to simulate the LOADM command from an ML program, as eventually the information to load the program is stored on the stack.

I suggest obtaining a copy of the September 1983 RAINBOW; Read the "Superpatch for EDTASM+" article by Roger Schrag. It adds a LOADM command to EDTASM+ and gives a good example of what you want to accomplish. Sorry, we don't have any more back issues, but maybe you can borrow one from a friend.

Passing Parameters

• We interface our Apple Ile (with serial card) to hospital lab instruments with an RS-232 port, matching the instrument transmission parameters (Baud rate, start) stop bits and parity) and manipulating the transmitted data using Applesoft BASIC control commands. For these applications, it is essential that sorting, reformatting and storing-to-disk operations on transmitted data occur under BASIC control without any operator interaction once the program is started. Are there any hardware/software products which will do the same on a CoCo? My impression is that most machine

language modem software is not designed for linking to BASIC and thus would not be applicable.

> Ronald G. Haas Marshfield, WI

You are correct, Ronald, as far as Disk BASIC is concerned. There are no provisions to allow remote data from the RS-232 port. A few remote terminal drivers have been written that allow remote input into BASIC programs, but it would be a major problem to match the instrument transmission parameters.

Nothing's impossible with the CoCo. Even though I've not seen an example, I'm sure a BASIC09 program can accomplish the task. What you are really interested in is the passing of parameters between procedures and remote I/O; both are possible with BASIC09. I would suggest using the RS-232 Communications Pak for your serial I/O. OS-9 Version 1.01 supports this device, and I think it would be a lot more reliable for your use than the standard serial I/O port.

Magical POKES

• While reading your department and others in THE RAINBOW, I saw many little POKEs here and there that make the CoCo do almost magical things. Do you know where I can get a list of some of these POKEs and how do the programmers find them? Also, if anyone is trying to get RAMs from Radio Shack — give up! They won't sell them because everyone is doing their own upgrade.

One more thing. My CoCo is a 16K; can I just stick eight 64K chips for more memory or do I have to do more than that?

Doug Wright Scarborough, Ontario

Doug, try obtaining a copy of 500 Pokes, Peeks 'N Execs. One source is Spectrum Projects.

As far as memory upgrades are concerned, you have to do a little more than install eight memory chips, such as move a few jumpers. Most of the time, the company that sells the chips will provide the installation instructions. Check our RAINBOW ads.

Zapping Granules Back

• I have a 64K Color Computer 2 with a disk drive, cassette recorder and a DMP-110 printer. A few days ago I was working with my CoCo with a program I made. In three consecutive days, I saved, loaded and killed the program many times. On the third day I found the computer erased about 95 percent of all the programs on the disk. The total of granules occupied, shown next to each program, is eight (there are eight programs occupying one granule each now; before, each program occupied about three to five granules each). When I asked for

granules free in the disk, the computer showed me there were 40 granules free. What happened with the other 20 granules not shown? I made three backups with different disks and they all gave me the same results. Can you explain what happened with the programs? If the corrections are with a machine language program, can you give me the program? I know nothing about machine language programs.

Carlos Santiago Mayaquez, Puerto Rico

The problem you mention is the most common type of disk failure, Carlos. Most likely, your programs are still on the disk; you just destroyed the directory.

To restore the lost programs you must understand how the directory information is organized. This information is in the rear section of your Disk BASIC manual, but we'll summarize it.

Track 17, Sector 2 contains the granule allocation table for the entire disk. Starting with byte one, each of the first 68 bytes, one for each granule, form a table that tells Disk BASIC if any information is on that granule. By the way, the granules are numbered zero to 67 (\$43). Granules that are available are noted by a \$FF. If the number is less than \$43, it points to the next granule in that particular file. If the number is between \$C0 and \$C9, this is the last granule of the file, the last number indicating the number of sectors in the last granule.

Track 17, Sector 3 is the start of the directory. Each file occupies 32 bytes, but only 16 bytes are used. The first 16 bytes indicate the following:

Bytes \$0-\$10	Filename and
	extension
Byte \$11	File type
Byte \$12	ASCII flag
Byte \$13	First granule of the
	file

Byte \$14-\$15 Number of bytes in last sector

I would guess that you destroyed the directory information, Carlos, and the granule allocation table was left intact. That's where your missing granules are and, with a little "zapping," they can be restored.

One other necessity is a "disk zapping" program. I use VIP ZAP, obtainable from your local Radio Shack store by express order. The manual gives a complete description of how to zap, or restore, damaged files or directory information.

Your technical questions are welcomed. Please address them to: Downloads, THE RAINBOW, P.O. Box 385, Prospect, KY 40059. We reserve the right to publish only questions of general interest and to edit for space and clarity. Due to the large volume of mail we receive, we are unable to answer letters individually.

CUSTOM COLOR

The Letter Box Printer Buffer Part 1

In Dennis Kitsz's premier article, he begins the first in a series on a cost-efficient way to build a printer buffer.

By Dennis Kitsz Rainbow Contributing Editor

uick! Raise your hand if you've heard of a 6803! No, it's not the microprocessor in the MC-10 (that's a 6803E). The 6803 is a close cousin, a microcomputer on a chip. It's the heart of a 64K printer buffer — I call it "The Letter Box" — for your Color Computer.

This is the first part of a series on building a printer buffer. I'll answer these questions: What is a buffer? Why do you need one? Why use a microprocessor for just one job? What makes the 6803 microprocessor a good choice for this job? Can the buffer perform other useful functions?

This project has been a long time in speculation. My friends often say, "You've been talking about a printer buffer for months. When will it be done?" I've told them, "I want it cheap, cheap, cheap! If I wanted it expensive,

I could have it designed by next week."

What is a Buffer?

Shortly after using a computer

(Dennis Bathory Kitsz is a composer, software 'author and an electronic designer. His computer career began in 1977 after paying his dues as a librarian, truck driver and graphics designer.)

printer, you begin to realize that — compared to the computers themselves — printers are slow mechanical devices. Even the fastest dot-matrix printers seem to take forever to print a program listing. And slow printers are . . . s-lo-w! You can catch three innings of the World Series and do two loads of wash while waiting for inexpensive "letter quality" daisy wheels, such as Olivetti or Brother, to print a long article.

A printer buffer acts as an electronic waiting room. It's a place for information to sit after the computer sends it to be printed, and before the printer is able to look at it.

Most printers have some kind of built-in memory buffer, but it seldom holds more than one line (256 characters). Newer units offer buffers of 1,024 to 4,096 characters, but even these fill up rapidly.

Some sophisticated Color Computer setups with disk drives and high-level operating systems have so-called virtual buffers, also known as spoolers, reserved on several disk tracks. The operating system fools the computer into "printing" to the disk (spooling). The operating system later extracts the information from the disk whenever the printer needs more to print (despool-

ing). (A box of burnt resistors to the first person who can recall the origin of the term "spool." Hint: It's an acronym.)

Those of us without the pleasure of an expanded disk system and tiny buffers in our printers need something else. The Letter Box is a smart buffer that holds a whopping 63,232 characters and plugs into the computer's printer jack. Best of all, you can build The Letter Box for under \$100.

Why a Microprocessor?

A printer buffer appears to be a simple thing. You transmit a series of characters, it receives and stores them, and transmits them to the printer when necessary. So, why use a microprocessor? Partly to reduce the amount of hardware, but, better yet, for bells and whistles!

With a microprocessor (MPU) in control, you can program the buffer to act "smart" and do other things: print a test routine of all the printer's characters; stop (or not) after a designated number of text lines; stop (or not) after every form feed; stop (or not) after two carriage returns (a paragraph); create a "translation table" for a laser printer or typesetting machine; know

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XTERM

XTERM is a full featured OS-9 communications program that takes full advantage of the power of OS-9. It works with the normal text screen, XSCREEN, or the Wordpak 80 column board.

XTERM is menu oriented for ease of use, it is simple to use even for the novice OS-9 user. And yet, XTERM is powerful enough for the expert OS-9 user.

Some of the features of XTERM include: full upload and download support with remote buffer operation; supports XON/XOFF protocol; 110/300/600/1200 baud, 5/6/7/8 bits, even/odd/no parity, full or half duplex; able to execute an OS-9 shell command from within XTERM.

XTERM works with a Color Computer using the standard serial interface, but also will work with a hardware serial port. Also, if you are using a hardware parallel printer port, you can print data to the printer as it is received.

XTERM \$59.95

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XMENU is a system that creates a menudriven environment for the Color Computer using OS-9. OS-9 now becomes easy-to-use with command selections made from menus. Menus are included to access OS-9 commands. An easy-to-use utility is provided that allows for the creation and maintenance of menus.

XMENU works with XSCREEN, the normal text screen, O-PAK, and the WORDPAK 80-column board.

XMENU 29.95

XSCREEN

XSCREEN creates a high resolution screen for the Color Computer using OS-9. This high resolution screen gives you 24 lines of text with 51, 64, or 85 characters per line. Characters can be either white on a black background or vice versa. Easy menu operation.

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XWORD

XWORD is a powerful word processing system for the Color Computer using OS-9. XWORD is feature packed with only a few features mentioned

Some of the editing features of XWORD include: true character oriented full screen editor; works with the normal text screen, XSCREEN. O-PAK, or WORDPAK 80 column card; full block commands with blocks displayed in inverse characters (except with normal text screen) for easy block manipulation; file size not limited to a buffer size; full find and replace commands with wildcard character; able to execute an OS-9 shell command in the middle of editing. Many, many more features, too many to mention here.

Some of the formatting features of XWORD include: proportional spacing supported; perfectly aligned hanging indents and columns, even when using proportional characters; full printer control with control of character size, emphasized, italics, overstrike, underlining (with or without spaces), super and sub-scripts; up to 10 header/footers; page numbering in decimal or Roman numerals; margins and headers can be set differently for even and odd pages; automatically reads printer initialization file to define XWORD for your printer (many included, and easy to write or modify your own). Many more features.

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XMERGE

XMERGE gives XWORD powerful mail merge capabilities. With it you are able to merge in data from a data file or from the keyboard to get professional looking results.

XMERGE 29.95



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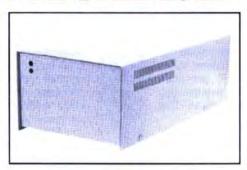
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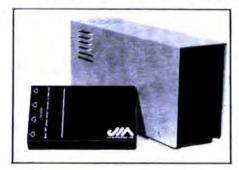
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What Else?

As they say in those late-night TV ads, "But that's not all!" The Letter Box is actually a 64K computer that uses the versatile 6803 microcomputer. Because it has serial input and output, this device can act as the nerve center for a laboratory control system, receiving and logging data, while your Color Computer is free to perform other tasks. If you're willing, you can turn The Letter Box around and use it as a kind of modem buffer when downloading long programs or texts. You'll have to let your imagination run free.

Why the 6803?

My goal in designing The Letter Box was to stuff the greatest number of features into the smallest number of parts for the least amount of dollars. With 64K DRAM (Dynamic Random-Access Memory) prices spiraling downward, these chips were the logical choice for a large buffer. Even cheaper (free!) are 16K DRAMs pulled out of Color Computer 2s that have been upgraded to 64K.

The buffer's operating system would have to be in some kind of EPROM (Erasable, Programmable, Read-Only Memory), and some "gluc chips" would be needed. (Glue chip is a clever "techie" term for those miscellaneous integrated circuits that keep a computer's processor, memory and input/output all held together.)

The biggest obstacle in building a cheap buffer is finding an inexpensive technique to perform serial input and output, the method the Color Computer uses to communicate with compatible printers. The Color Computer transmits, and printers expect to receive, a stream of characters sent at 600 Baud (bits per second). I wanted the Color Computer to quickly transmit and fill the buffer, then return to the program work. The printer could then accept information from the buffer at the usual 600 Baud pace.

My first option seemed to be to use some sort of traditional UART (Universal, Asynchronous Receiver-Transmitter) to perform the task — at least until I took a good look at the 6801/6803 microprocessor family. I got the hint by tinkering with Radio Shack's Micro Color Computer, the MC-10, which contains a 6803E microprocessor. Although the MC-10 was a marketing flop, I had always been impressed by its speed, features and the number of commands and options that had been crammed into its Microcolor BASIC operating system.

timer and as an SCI (Serial Communications Interface). The SCI is the key to the functioning of The Letter Box.

The 6803 also has an internal 128-byte RAM. With its option for battery backup, this RAM can be very handy for lab or industrial control. This project won't use the backup feature, however.

The 6803 has the usual address lines 8 through 15. An important consider-

"The biggest obstacle in building a cheap buffer is finding an inexpensive technique to perform serial input and output, the method the Color Computer uses to communicate with compatible printers."

But what really caught my attention was the 6803's built-in serial input/output system. Depending on the choice of crystal frequency and the sequence of internal commands, the 6803 can be made to transmit and receive serial data at 150, 300, 600, 1200, 4800, 9600, 38400 and 76800 Baud.

Since the 6803 cost less than \$10, my solution seemed at hand — almost. Some questions remained: Could the 6803 switch between Bauds (say, between 600 and 4800) "on the fly"? Could the 6803 be set up to perform the memory refresh necessary for DRAMs? If it could refresh DRAMs, would the number of glue chips grow too complex and expensive? And, finally, could a parallel printer port be squeezed into the design with no additional parts?

A Closer Look

To answer these questions, a closer look at the 6803 is needed. Among other connections, the 6803 has pins for Vcc (+5 volt power), Vss (ground), Xtal and Extal (crystal or master clock inputs), 'E' (enable signal used to synchronize with memory or peripherals, one-quarter the master clock frequency), NMI (Non-Maskable Interrupt), IRQ (Interrupt Request) and RES (reset). We'll describe how all of these are used during the theory and construction part of this series.

One of the 6803's attractive features is that it has two input/output ports. Port 1 is a complete eight-bit parallel port (maybe for that parallel printer option?); Port 2 is a specialized five-bit port. It can be used as an ordinary parallel port, but is also usable as a

ation in using the 6803 is the multiplexed data/low-address bus. Because the number of external connections is limited to 40 pins, the designers had to squeeze the eight data lines (D0-D7) and eight low-address lines (A0-A7) onto the same connections. The AS signal (Address Strobe) is used to let the circuit know when the address lines are changing to data lines.

The whole process of multiplexing and de-multiplexing is at first a mysterious one, and there are two major instances of it in this project: with the 6803 microprocessor (squeezing eight data and eight address lines together), and with the dynamic memory (squeezing 16 address lines onto eight pins). More about that later.

How Do You Start?

This project involves building a computer. How do you even start thinking about that? It's overwhelming.

Some of the thinking is done simply by acknowledging what you need to do — have cheap memory, a serial interface, a simple operating system, low parts count and low cost. And part of that work is done since the type of memory (64K DRAMs) and the microprocessor (6803) have been chosen to fill the essential needs. Now what?

What about memory refresh? What is it, and how is it accomplished? By now you've probably heard the analogy that dynamic memory is like a tire with a slow leak — it needs a burst of air every so often to keep it inflated. The technical characteristics of this kind of memory are such that 256 contiguous memory locations have to be read or pulsed at least every 1/500th of a second

to keep the stored information reliable. Memory manufacturers specify several patterns for reading or pulsing.

Turn first to a familiar example: The Color Computer uses DRAM, but its refresh is performed by a sophisticated memory-management circuit, the Synfree time to refresh the DRAM. For a printer buffer, that might be overdoing it. Also, the SAM is expensive (\$20 or so) and incompatible with the 6803.

One of the other often-used options is the refresh counter. This is a group of integrated circuits tied to the MPU

utive addresses, why not do it the oldfashioned way? That is, why not have the MPU simply read 256 consecutive bytes every two milliseconds (ms)?

Here's where the 6803 has an advantage: its built-in timer and interrupt system. By calculating the operating frequency of the 6803, it can be determined how long the internal timer must count before it's time to interrupt the MPU's normal operation and make it perform another memory refresh. Table 1 shows that process in 6803 talk.

No extra hardware! Cheap, cheap, cheap! A silly idea, you say? There is a very famous and highly regarded personal computer (I'll let you guess which one) that uses precisely this technique of "software refresh."

Next time: timing, multiplexing, demultiplexing and a start on building the circuit.

"The whole process of multiplexing and demultiplexing is at first a mysterious one, and there are two major instances of it in this project: with the 6803 microprocessor . . . and with the dynamic memory . . ."

chronous Address Multiplexer (SAM). The SAM mediates between the microprocessor (MPU) and its memory, shoots information to the video display when needed, controls a number of input/output functions and monitors the computer's memory map; it uses its and its master clock in such a way that when the MPU isn't using the memory, a refresh address and appropriate pulse are provided.

But refresh counters mean more hardware, and more expense! If refreshing memory means reading 256 consec-

> Table 1 A Software Refresh Scheme for the 6803

R	AM:	Instruction	1:	Comment:	Cycles:	
N	NNN	Interrupt 1	RQ2	*Output comp. —> RAM vector	(1×12)	
X	X00	LDD	<\$000B	*Get old output comp. value	(1×4)	
X	X02	ADDD	#OFFSET	*Add next interrupt time	(1×4)	
X	X05	STD	<\$000B	*Place new out. comp. value	(1×4)	
X	X07	LDD	#\$0000	*\$XX07,8,9 (fetch/read/read)	(1×3)	
X	X0A	LDD	#\$0000	*\$XX0A,B,C (fetch/read/read)	(1×3)	
		LDD	#\$0000	*\$XX0D,E,F - \$XX79,A,B	$(37x \ 3)$	
X	X7C	LDD	#\$0000	*\$XX7C,D,E (fetch/read/read)	(1×3)	
X	X7F	RTI		*Return from the interrupt	(1×10)	
					-	
				Total MPU cycles in refresh routine	154	
				Total MPU cycles in 2 milliseconds		
				@ 2.4576 MHz master clock	1228.8	
				Refresh overhead taken from MPU operation	12.5%	
				•	70	_
						(A)

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ACCESSIBLE APPLICATIONS

Using A Spreadsheet As A File Manager

By Richard A. White Rainbow Contributing Editor

h! You noticed the new title for the column. After a few weeks of discussion around THE RAIN-BOW offices, "Accessible Applications" surfaced. I rather like it for what it communicates in two words. The power of the computer should be accessible to the user. I think that means easy to use.

How easy? Easy enough to start simply and do something worthwhile, then, step by step, learn the harder tasks. The second requirement is that it be fairly easy to remember how to use the application. Spreadsheets typically meet these requirements. Other applications don't necessarily.

A powerful file program may let you define simple record structures, enter data, save it, reload it and review it. When it comes to printing that data in a nicely formatted report, the new user runs into a wall in the learning curve. There is a lot of complexity in describing to a computer just what is wanted.

(Richard White has a long background with microcomputers and specializes in BASIC programming. With Don Dollberg, he is the author of the TIMS database management program.)

Spreadsheets come off well in the printing area, since "What You See Is What You Get" — WYSIWYG for short. As long as your work looks good on the screen, it should look good printed.

On the other hand, learning the complexities of one of the CoCo file programs can be a lot simpler than trying to write a program in BASIC to do the same thing.

There are differences between programs of the same type, too. A fairly simple file manager like *TIMS* is very easy to use for small databases, but it will not open four disk files and draw selected data out of each to generate a report. For this you need something like *Elite*File*, which has some horsepower, and you need to figure out how to use it.

The word processor, even a simple one, can vastly increase one's productivity. Frankly, I would not even try to write this column without a word processor. There never was any love lost between me and the typewriter.

And, we are dealing with applications. These are computer tools to get work done. I have named three types. They handle the bulk of the work that is done on computers, but there are others: accounting software, telecommunications, inventory management, ordering, shipping, billing and so on. There are separate software packages for each of these applications. Some, however, can be done with a spreadsheet or a file manager. Indeed, a spreadsheet or file manager does nothing until the user programs an application into it. They can be considered a higher order language in their own right whose purpose is to help the user access the computer.

RAINBOW Managing Editor Jim Reed tried the loan payment template in my June column and immediately found some problems with two equations. In one case, the letter 'H' had been substituted for an up arrow and the following open parenthesis had been dropped. In the other case, the up arrow was again dropped and the letter 'C' which immediately followed had been printed in lowercase. It smells like a machine problem. Somewhere, some software is thinking the up arrow is signaling that a control code is following and we are on that trail.

A question that Jim had was how did I replicate the part that calculates

the individual loan payments for each month the loan is outstanding. To refresh memories, a portion of the spreadsheet showing only two months is shown in Figure 1.

The objective was to copy the Al-... D16 down the spreadsheet startin

12-START PRINCIPAL B2

15-START PRINCIPAL D13

13-PRINCIPAL PYMT

16-PRINCIPAL PYMT

30

B5-D15

Figure 1.

E

11-MONTH

14-MONTH

saved keystrokes in the exact series the number of times you specify.

How does this help? Say I were to replicate range A14 . . . D14 to A17 and then moved the cursor to cell A17.

	A14 arting					just before ence, I could	
. 1	В	30	С	Œ	а	3	
	5-D12				12*(B3 12-B13	/12)	
-	11+1 13	11	NTERE	ST B	15*(B3	/12)	

PRINCIPAL B15-B16

in cell A17. Elite*Calc simply lets you copy the range to A17. You need to tell Elite whether or not to change the cell addresses. Since B3, the interest rate, and B5, the payment per month, are referenced for each month's calculation they should not be changed, while all the others must be. Next, you copy two months' worth at a time, then four, etc.

Life is not so simple with DynaCalc or VIP Calc. They provide only a replicate function that allows you to replicate one cell to a row or column of cells. That's not what we want. Replicate can also copy a row of cells to other rows. That's closer, and we will have to settle for that in some way.

In VIP Calc you would replicate range A14 ... D14 to A17. Next replicate A15 ... D15 to A18 and finally A16 ... D16 to A19. That handles one month. Repeat the process till you have replicated all the months you need. Jim couldn't quite imagine me doing that for a range of 36 months.

I can't imagine doing that either, but he caught me cold months after I made the spreadsheet and I could not immediately remember how I did do it. The answer is a command in DynaCalc called "Keysaver." Properly used, it is better called "Lifesaver."

I try to deal mainly with functions that are common to most of the CoCo spreadsheets. There are times like this where rules must be broken. Many DynaCalc owners need to understand

Simply stated, DynaCalc remembers all the keys you press after pressing the BREAK key. There is probably a limit, but I haven't reached it yet. After you have completed a series of command keystrokes, press '/' and 'K'. DynaCalc asks "times?" Type a number and press ENTER. DynaCalc then performs the now enter /K1. DynaCalc would start at A17 (that's where the cursor was), call Replicate, define the start range, A17...D17, define the target cell, A20, respond to the Same-Relative questions for each equation and move down to cell A20 at the end. Wow!

But, I needed more than one more replication: I needed 33. So I used /K33 and sat back to watch the screen dance. Ranges A15 . . . D15 and A16 . . . D16 were handled the same way and the whole spreadsheet was done over a period of several minutes. Other Keysaver uses include inserting or deleting bunches of rows or columns. You could change the format on all the cells in a row or column without disturbing the data or equations in the cells.

Keysaver isn't perfect. I have had infrequent problems with arrow key movements, but arrow key movements at the end of a keystroke sequence seems to work all right.

Moving onto the title topic, a spreadsheet makes a simple but effective file manager, so let's discuss some basic concepts of file management. A file is a collection of records. This brings to mind phonograph records, and you might have quite a few. You could make a file of the titles of all the albums. Widen Column A to 20 or 25 characters and type in the names into cells down the column.

OK, they are out of any logical order so there needs to be some sorting out. Spreadsheets sort by exchanging columns or rows. Everything in the row or column is swapped with the next. This is not a mindless swapping — the spreadsheet looks within a range you give it and does the sorting according to the contents of the cells in the range. At this point, to sort the album file, you would use a range in Column A to include all the titles. The sort function works from the left-most character in each name comparing characters with the next name until a mismatch is found. A swap occurs according to fixed rules.

First sorting can arrange the records in ascending order, where the smallest is first, or in descending order, where the smallest is last. OK for numbers, but which is smaller, 'A' or 'B'?

In the back of your Getting Started With Color BASIC manual (remember it?) is a table of ASCII values. All the characters you can type from the keyboard, and then some, are shown with a number assigned to each. That number is the ASCII value and it's that number that CoCo uses to decide if 'A' is larger than 'B'. A's ASCII value is 66 while B's is 67, so the computer thinks 'B' is bigger and you aren't going to change its mind.

Let's check out the rats in ASCII's woodpile. Here is a file of names of computer books on my shelf sorted in ascending order.

Programming the Z80 1-2-3 A to Z **BASIC09** Tourguide Introduction to Pascal The C Programming Language Computers for Technicians

A record with a leading space always sorts to the top of an ascending sort. You may not notice the space and wonder how a record got so out of order. That's how Programming the Z80 got to the top.

Numbers have lower ASCII values than letters so 1-2-3 A to Z is just where it should be. By the way, the order of numbers is 0123456789. If you enter dates like 7/4/85 and 10/12/85, month 10 will sort before month 7. This is why you see computer-produced dates like 07/04/85. The leading '0' sorts ahead of '1' and puts July before October.

Finally, lowercase letters sort after all uppercase letters. There are some punctuation and special characters before the numerals and some after, but all sort before the alphabet.

The album file only contains the names of the albums. These are only in Column A. Each row is a record and each has only one field in use, the Column A cells. Let's call Column A the NAME field.

There is other data that is associated with each album such as performers,



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P.O. Box 11932 Edmonton, Alberta T5J 3L1 Phone: (403) 421-8003. publisher, type of music, date of publication, your rating of the performance and playing time, to name a few. A column could be devoted to each of these data types with the particular data entered in the proper column in the row with the title to which it pertains. Again, each row is a record that now would have a number of fields of data. You have done this sort of list on paper before, but you were probably not thinking in terms of records and fields when you did.

Now your sorting options become broader and you can do a number of sorts on the file. First, let's sort the whole file by type of music. Call the sort again and give the range for the column containing the music type data and include all the rows in use.

With that sort made, you might want the hard rock-type music sorted by performer. All hard rock albums should now be in one group in the spreadsheet. Sort using the performer column, but limit the range to only those rows that include the hard rock entries. You could have sorted hard rock by title or even year of publication as well.

Which way should the file be stored, on tape or disk? It's something to think about. If you have spent some time making multiple sorts, think about storing the file that way. You can always load it and resort it if it needs to be arranged differently for a specific purpose. You can even save it sorted in a number of ways to different separate files, but keep in mind that when updating time comes, you will have to update multiple files.

Don't forget the columns; they can be sorted as well without jeopardizing the integrity of the information in a record. The fields will just be in a different order in a record.

DynaCalc has a Locate Label function called by <L. DynaCalc then asks for a string to search for. This string is just a sequence of characters and need not be a full title or name. Using my book list, I might search for C and get four books reported. If I gave the program C only, The C Programming Language would be found. This provides a fairly powerful and useful search capability. Even the famous Lotus 1-2-3 on an IBM PC cannot do this so easily.

But, the search superstar has to be VIP Calc. With its Locate command, you can find values, labels or the result of a formula. You can mask a string

search so VIP Calc will ignore case. You can even have wild card characters if you don't quite know the right spelling. This combined with VIP's large data buffer makes the program a good candidate if you have some spreadsheet file work and would prefer to learn just one program.

If WYSIWYG (What You See Is What You Get) is a strength in a spreadsheet, it is a real weakness in a file manager. It very much limits how you can print a file. For example, mailing labels are out with the whole record on one line. You could save the records out to disk as an ASCII file and use a BASIC program to read and rearrange each record, then print it to a mailing label. If you are only going to print the list one way, the task is not particularly hard if you know BASIC. If, however, you are a user and not a programmer, it's another matter.

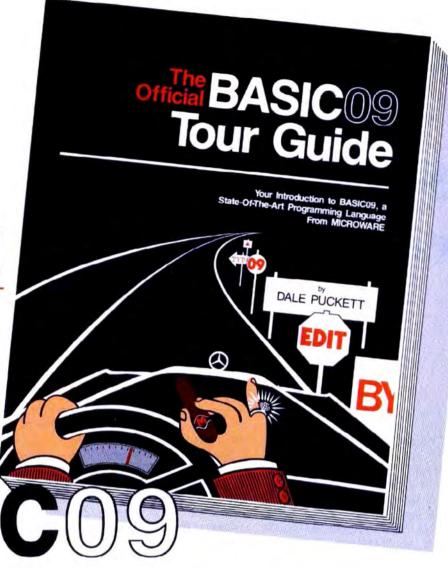
You can sort the columns or move the columns to get a number of fields adjacent and print those fields and not others. Say you were selecting music to play on some program and wanted to use playing time as an important selection criteria. Sort the file on the playing-time column, then group the name, performer and playing-time fields next to each other and print these fields only. This printout would be highly useful in developing the program and give just the informantion you needed.

These are rather simple types of printing. That they meet many users' needs is the remarkable thing about a spreadsheet.

Earlier, I mentioned that a BASIC program could be written to print mailing labels using data from an ASCII file of records from a spread-sheet. This approach was somewhat common a few years ago when more users were also programmers and the software available was simpler than today. Programmers would set up a user with an application on a file manager like *Profile* on a Model II, 12 or 16, then write a number of BASIC programs to use files from *Profile* to generate customized reports and other printouts.

The mailing list is a natural and the same customized output could be sent to a file and used with a mail merge program to prepare customized form letters. Next month, we will try to have a BASIC program to do at least the first task for you.

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KISSable OS-9

OS-9 Gets Good Reception At NCC

By Dale L. Puckett Rainbow Contributing Editor

S-9 fans attending NCC — the National Computer Conference — in Chicago during mid-July were greeted with good news. First, OS-9 went over extremely well at the show.

"The awareness was much better at NCC this year," said Frank Hogg, president of FHL in Syracuse. "In the past when you mentioned OS-9, you were usually met with a blank stare. This year, people knew what you were talking about and many of them were excited about it."

Hogg set up his "QT" in the Microware booth and was dazzling the crowd with the multi-user system that fits in a space the size of a Kleenex box. He also announced his new "QT Plus" at NCC. QT Plus features a 68000 running at 10 MHz, a 16-bit data bus, 512K RAM standard and up to 128K of ROM. It also supports four floppy disks, is expandable to one megabyte

(Dale L. Puckett is a free-lance writer and programmer who has worked with the Motorola family of microprocessors since 1976. He is the author of The Official BASIC09 Tour Guide, published by Microware and The Official Rainbow Guide to OS-9, published through the Rainbow Bookshelf. He serves on the InfoWorld Software Review Board and is a chief warrant officer in the U.S. Coast Guard.)

and uses a multilevel interrupt structure for improved I/O performance.

Sometime in the near future Hogg plans to offer a QT that features a new single board computer from GIMIX. This product will use a 68020 and come standard with two megabytes of memory. Hold on to your hat; the sky's the limit in this new 68K ballgame.

Hogg passed along two additional tidbits we thought you would enjoy. He reports that a new one-megabit chip—yes, you read it right, one million bits on a memory chip—is due to be released by Hitachi very soon. We may need Level II OS-9 on the Color Computer sooner than we thought. And finally, AT&T, the company that brought us UNIX, reached out and bought a QT from FHL.

New Graphics Drivers Announced at NCC

The really big news from Des Moines came in a joint announcement from Microware, Hitachi and Graphic Software Systems. The three firms joined forces to develop a complete set of graphics support modules for Hitachi's new ACRTC device — the HD63484. The new drivers conform to the proposed ANSI/ISO Virtual Device Interface (VDI) standard and give software developers a way to write portable graphics-oriented applications soft-

ware. The standard itself was selected by both IBM and AT&T as the *de facto* standard graphics development environment for PCs. Now, it's available on OS-9.

"We have achieved an incredible level of integration of all the hardware and software pieces an OEM needs to build a state-of-the-art graphics system," said Ken Kaplan, president of Microware Systems Corporation. "Hitachi and Microware can now offer a total solution to manufacturers of personal computers, CAD/CAM systems, graphics work stations and similar products."

The drivers let programmers mix graphics images with text data displayed in multiple fonts. The software itself can be developed using Microware's C compiler running on a 68000-based development system or a large DEC VAX time-sharing system. BASIC, PASCAL and assembler programming languages with graphics capabilities are also available.

The HD63484 is a bit-mapped controller that contains three on-board processors. It operates at a clock speed of 10 megahertz, draws at a 400 nanosecond per dot rate and creates images of up to 4,096-by-4,096 pixels. The hardware itself can draw dots, lines, rectangles, polylines, polygons, circles and ellipses. It can also paint, fill and copy objects in 65,536 different colors.

Incredible!



Multi-User!

Frank Hogg Laboratory announces their Quad Terminal (QT) series of multi-user computer systems, designed to run Microwares new OS-9/68000 operating system. The QT offers 32 bit processor power in a compact integrated package that requires only a terminal to operate.

The QT hardware features: 68008 processor running at 8 Mhz, 128K bytes expandable to 512K bytes, an interval timer for time sharing, 4 serial ports with selectable baud rates from 300 to 19,200, 2 centronics compatible parallel printer ports. Supports 2 double sided double density 96 tpi floppy disk drives and a SCSI (SASI) bus interface for Winchester disk drives. The QT is available as a single floppy (1), a dual floppy (2) or as a single floppy and a 10 or 20 megabyte hard disk (HD). Size 5 1/2 high, 11 1/2 deep, 9 1/2 wide. Can be mounted vertically or horizontally.

Software Included!

SOFTWARE included is OS-9/68000, the 68000 version of the proven OS-9 operating System that is both disk and file compatible with standard and Color computer versions of OS-9. Basic09 is the 68000 version and is source compatible with the 6809 version. DynaCalc is the 68000 version of the proven 6809 spreadsheet. Stylograph is the 68000 version of the popular 6809 word processor. Mail merge and speller are the 68000 versions of those programs. Programming tools included are a relocating macro assembler with linkage editor, screen and line editors, and an interactive debugger. The software has a retail value in excess of \$2000 and is INCLUDED free! Programming languages available and under development include C, Pascal, Fortran and Sculptor. OS-9 is a TRADEMARK of Microware.

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Note: The QT can hold 2 half height drives internally (floppy or hard). Provision has been made for hooking up external floppy drives. This allows using large capacity full height hard disk drives in the QT case with floppy drives in another case. You can boot from the hard disk so floppys would only be necessary for program transfers and backup. Removable hard drives are also available. Call or write for complete specifications and prices.



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Fourth Annual Microware Seminar Set for November 1-4

Speaking of Microware, don't forget to make your reservations for the Fourth Annual Microware Seminar. It gets bigger and better every year. As Jeanne Kaplan said in a flyer mailed recently, "OS-9 is emerging from its 'underground classic' status and establishing itself as a new industry standard." And just think, you knew it would all along — ever since you fired it up on your CoCo.

I highly recommend this seminar for anyone interested in exploring the inner workings of OS-9 and improving their programming skills. The titles for the planned sessions alone will make your mouth water. Here are just a few: C Tricks and Treats; Everyday OS-9 with a tutorial on the OS-9 Shell and utility commands; 6809 Technical Topics, with a demonstration that shows how to install customized drivers and related modules: 68000 Technical Topics with demonstrations showing how to adapt OS-9 to custom I/O devices and install it on new systems; Introducing NFM, a demonstration of the new OS-9 networking package; Graphics, an introduction of the new ANSI Virtual Device Interface and Graphics Kernel System running on OS-9; and finally, CoCo Special Interests, featuring news, tricks and treats for Color Computer OS-9 users.

The registration fee for the seminar is \$150. For further information, contact Jeanne Kaplan at Microware, 1866 N.W. 114th Street, Des Moines, Iowa 50322, or call her at (515) 224-1929.

Users Group to Meet at Princeton RAINBOWfest

OS-9 Users Group members will have a chance to get together for a short meeting at RAINBOWfest-Princeton, thanks to Marianne Booth, RAINBOWfest coordinator. She arranged for the group to use one of the large meeting rooms immediately following the last seminar Saturday. We'll have the room for at least an hour — maybe longer. If we're lucky, we may even know the results of the election and be able to introduce you to the new officers.

Speaking of the new officers, Brian Lantz of Tampa, Fla., the author of several popular OS-9 programs for the Color Computer, surrounded himself with an impressive slate and ran for president in the group's election in September. William W. Turner III, a

senior systems programmer for telecommunications support with GTE Data Services in Tampa, ran for vice president, and Steve Odneal, director of Microprocessor Management Systems at a Kansas City Bank, ran for secretary. Brian was still trying to find a candidate for treasurer when this column went to press. However, George Dorner, the incumbent and a dean at Harper College in Rolling Meadows, Ill., promised Brian he would run if there were no other candidates.

The group now has more than 800 members around the nation and has distributed more than 1,000 disks from its 37-disk software library.

Good Reviews

I've heard good comments about several of the programs we've highlighted in this column during the summer. George Dorner, OS-9 Users Group treasurer, reports in Issue Number Eight of MOTD, that XCom9 — OS-9's first "freeware" program — is a real bargain.

"XCom9's major advantage is its XMODEM protocol for uploading and downloading files," Dorner said. "Other notable features include an ASCII mode which strips parity, tabs and other bothersome characters. You have complete control over most of the program's parameters and can even send a break with the 6850 ACIA."

Dorner reports that XCom9 sports built-in help messages and says the documentation is excellent. Chuck Buche and Jeff Rhodes, CoCo owners in the Chicago area OS-9 Users Group, also reported excellent performance when using the program to transfer files from a UNIX system and CompuServe. They were using the device /T2, which works with the ACIA Pak drivers in Version 1.01, and had Word-Pak installed. You may download the program from the DL4 database in the OS-9 SIG or obtain it for the cost of duplication from author Greg Morse, Morse SoftCode, 10871 Roseland Gate, Richmond, British Columbia, Canada V7A 2R1. It will also be available from the OS-9 Users Group Software Exchange Library in the near future. If you like XCom9 and use it, a \$20 donation is appropriate.

Dorner also had many good things to say about Steve Odneal's Kansas City BASIC for OS-9. Odneal was one of the first programmers to bring the FLEX operating system to the Color Computer. He started with Santa

Barbara Tiny BASIC, which was published in Dr. Dobbs' journal several years ago, and added many enhancements. Quoting Dorner, "KCB looks a lot like a pretty vanilla Microsoft BASIC or Extended Color BASIC. Odneal has added PEEK, POKE, dynamic allocation of variables and string space, disk access, tokenized storage, most string functions, expandable storage space, and Shell commands from a command line or program to Santa Barbara BASIC."

Yet, the most important value of Odneal's Kansas City BASIC is the educational opportunity it presents. For \$25 you get both a 23-page manual and documented source code. If you've always wondered how a BASIC interpreter worked, Kansas City BASIC gives you a chance to find out. And, Odneal is looking for user-developed extensions to his interpreter and promises to put the best of them into future releases. You can get Kansas City BASIC from Steve Odneal, 8609 East 73 Terrace, Kansas City, MO 64133.

The OS-9 Solution, written by Jeff Francis and distributed by Bob Rosen at Spectrum Projects, Inc. (P.O. Box 21272, Woodhaven, NY 11421), also received a good review from Dorner. Generally, Dorner's review came to the same conclusion as our report in August. However, he made a strong plea for a Level II version. Again, we quote Dorner: "... it might be very useful to everyone if memory were more plentiful . . . like on a Level II system. It is a significant program since it is the first such front-end utility. I hope it prospers, grows and becomes even more useful.'

Are you reading, Jeff? Are you reading in Fort Worth?

Using Tandy 'C' with One Disk Drive

We received some useful information for those wanting to run the Color Computer C compiler with one disk drive from Jonathan R. Guthrie of Westerville, Ohio. It seems I got his attention in my C tutorial when I said you must have two disk drives to compile C programs. He had been getting the job done with one disk drive for more than six months. Most importantly, he was nice enough to share the information with us. Here goes:

"The problem is two-fold. First, two of the modules that make up the compiler — specifically C.PREP and C.LINK — expect to find certain data

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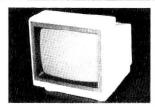
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files on /D1. And second, the blamed thing is just too darn big to fit on one — 40-track in my case — floppy disk drive.

"The first problem is the easiest to solve. I redefined the physical device that is associated with the logical device / D1. I did this using DEBUG to change the right byte in the device descriptor. I installed the procedure file below in my start-up file to do the job. Later, I made the changes and used OS9-Gen to create a new boot file with the modification "built in." Here is the procedure.

DEBUG L D1 .<SPACEBAR> .+13 =0

"The second problem has a simple solution if the thing will not fit on one disk, put it on two. Unfortunately, that approach is rather hard to implement because you need to copy a lot of files. But, after you have moved your files onto two disks, you need only use the "-A" switch on the CC1 command line to divide the compilation process into two equal halves.

"You must put the file you want to compile on the first disk and — after changing your current data and execution directories to the new disk, type:

CC1 filename.c -A

"After the file has been compiled halfway, you will get the OS9 prompt back. If you do a directory at this point you will find a new file named "filename.A" in your data directory. Copy this file onto the second disk; change your current data and execution directories over to this directory and type:

CC1 filename.A

"When the compiler returns the OS9 prompt again, you will find your compiled program in your current execution directory. That's it. Good luck and happy computing."

Thank you, Jonathan, for sharing this information with our readers.

Here are the directory listings on the two disks Jonathan uses to compile C programs. First on disk number one:

directory of /d0 CMDS	DEFS	c.com	
directory of /d0)/CMDS		
CC1	C.PREP	C.PASS1	C. PASS2
COPY	DEL	DIR	ЕСНО
LIST			
directory of /d0)/defs		
ERRNO.H		CTYPE.H	DIRECT.H
MODES.H	MODULE.H	OS9.H	OS9DEFS.A
SETJMP.H	SGSTAT.H	SIGNAL.H	TIME.H
Here is a listing	of the files on di	sk number two	
	CMDS LIB	ok namoer two.	
directory of /d0)/cmds		
CC1	C.OPT	C.ASM	C.LINK
COPY	DEL	DIR	ECHO
LIST	PROG	KCPROG	hello
PROG2	MALE		
directory of /d0)/lib		
CSTART.R			

Bruce A. Williamson had a similar problem and came up with yet another solution, a BASIC09 program. We'll also share it here.

Bruce owned 80-track drives and wanted the option of using either /d0 or /d1 while he was compiling his C programs. His solution was a "brute force" BASIC09 program named cc3. In his words, "It may not be the best example of BASIC09 programming or may not suit everyone's needs, but it is very easy to modify. One possibility I've already considered is to add a chain command at the end to chain to the .com file."

Bruce's program requires that C.PREP be patched and renamed D.PREP. He shows you how to do it in the listing named cDiff. Although he would not have had to rename his LIB and DEFS directories, he did so because he did not want to merge directories on /d0. If you do not rename your directories, you will need to change the appropriate lines in the program and patch C.PREP (see Listing named cDiff1. He is presently rewriting cc3 in C and plans to make it available in an OS-9 database.

Three Prime Number Programs without GOTOs

We really woke up the sleeping giant when we published the challenge to rewrite the prime-number generating program without line numbers. This month, we'll show you several versions and share some of the dialog we received.

Our first listing was submitted by Kevin Cantwell, of the Washington State Department of Licensing. Kevin has a degree in mathematics, lives in Olympia, Wash., and has worked as a programmer for both the United States Air Force and the National Oceanic and Atmospheric Administration. He writes:

"I changed some of the logic to correspond to the apparent design attempt of the program . . . since for the version printed the 'XXXX is a prime number!' message and the last prime divisor would not be printed. The listing, *Primes2*, corrects this problem and eliminates all GOTOs. It is a bit slower and takes just under three minutes to discover that 44449 is a prime number.

"It may be worthwhile to point out that the real use of the *Primes* and *Primes2* programs are to find the prime divisors of a number, rather than to find primes. If you simply need to find out whether a number is a prime, the second program, *QPrimes*, will check it much faster. This program economizes in two ways: It stops when the first divisor is found, and it makes use of the fact that a composite — or non-prime — number must have one divisor smaller than the number's square root."

Our next challenger was Steve Goldberg of Bethpage, N.Y. He got rid of the GOTOs in the original listing by using the WHILE... ENDWHILE,

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REPEAT . . . UNTIL and the LOOP . . . ENDLOOP constructs of BASIC09. His procedure is named "primes."

H. Bruce Phillips of Bolingbrook, Ill., also contributed a solution that eliminated the GOTO statements in the original. His program demonstrates how to run a procedure from another procedure and he uses a procedure named "runprimes3" to run his main program named primes3. Bruce writes:

"I made one important change. If 'N' is the integer to be factored, then Joel Sherman's maximum trial divisor is N/ 2. However, it need only be SQRT(N). If a trial divisor greater than SORT(N) is used, then the resulting quotient would be less than SQRT(N) and would have been tried previously. This results in a large savings at run time. For example, my program finds the number 44449 is prime in less than two seconds, compared with the two and a half minutes it takes Sherman's program. The eight-digit number, 12345678, factors in about 15 seconds and the number 87654321 takes about 22 seconds to factor. I also removed the recursions from Sherman's Procedure Prime. They were not needed and merely used up memory."

A Tip for Hard Disk Users

Greg Law sent us a note with a tip for people attempting to install a patch that lets you use the OS-9 DCheck utility with a hard disk. The patch is one of a group written by Sandy Trevor and stored in a file named HARD. PAT in one of the OS-9 SIG's databases. It seems the patches for DCheck are for OS-9 Version 1.00.00. Here are the offsets for Version 1.01.00.

Offset	Old	New
13E0	44	48
27C3	F4	A9
27C4	D5	A2
27C5	DD	CD

Essentially, the patch changes the 'D' in /D0 to an 'H' and makes it read H0. Then, it corrects the CRC bytes in the file so OS-9 can load and execute

More about Kermit

Mark Sunderlin in Winchester, Va., sent us a note with more information about the Kermit communications protocol after we mentioned it several columns back. Kermit, a program copyrighted by the trustees of Columbia University in New York City, is available in the CoCo SIG on CompuServe.

If anyone knows of an OS-9 implementation, please let us know and we'll pass the word in this column.

You may also order computer tapes of the Kermit program (not cassette) direct from Columbia University. However, since they are not set up to distribute free software on the scale required for a project such as this, you must pay them their cost for media, printing, postage, labor, etc. They would like a \$100 donation for the complete package; \$5 for a printed document such as the Kermit Users Guide or the Kermit Protocol Manual.

Their code is available for the

nocomp=TRUE

following systems: TOPS-10, TOPS-20. IBM VM/CMS and also on a standard ASCII tape with ANSI Label, Format 'D'. Write: Columbia University Center for Computing Activities, 7th Floor, Watson Laboratory, 612 West 115th Street, New York, NY 10025.

Kermit is not necessarily better than many other terminal-oriented file transfer protocols — XMODEM for but it is free, welldocumented and has been implemented compatibly on a number of microcomputers and mainframes. Most Kermit implementations also let you send files in groups with a single command.

```
Listing 1:
PROCEDURE cc5
        REM cc3
 gggg
 ggg6
        REM author Bruce A Williamson
        REM permission granted tto publish in Rainbow magazine
 gg22
 ØØ57
        DIM inpath$, outpath$, outlin$:STRING[120]
        DIM libdriv$, option$, ext$:STRING
 006B
        DIM outp, pointer: INTEGER
 997A
 ØØ85
        DIM whichdriv, nopt, noasm, nolink, nocomp: BOOLEAN
 ØØ90
        PRINT "This program generates a c.com file"
        PRINT "which will perform the prep and link operation"
 ØØC3
 gar5
        PRINT "on /dg or /dl."
        PRINT "The required inputs are the c source file name"
 9197
        PRINT "and the drive on which the c library is located."
 @139
        PRINT "The LIB directory must be renamed CLIB"
 Ø16D
 Ø197
        PRINT "on drive Ø and the DEFSs must be CEFS on drive Ø."
        PRINT "You also must have a version of c.prep which is pattached"
 Ø1CC
        PRINT "for /dg/CEFS and renamed d.prep"
 Ø2Ø9
 Ø220
        PRINT
 Ø22E
        PRINT "This program allows three options "
        PRINT "The options are O-skip optimizer A= stop before assembly"
 0254
        PRINT "and L= stop before linking."
 9299
        PRINT "Commas are not needed in the options but may be included."
 Ø2AF
        PRINT "Valid filename suffixes are .c .a and .r"
 Ø2EC
 Ø318
        PRINT "Suffixes have priority over the options in case of conflict"
        PRINT "Multiple source files are not allowed"
 Ø357
        whichdriv=FALSE
 Ø38Ø
 Ø386
        nopt-FALSE
 Ø38C
        noasm=FALSE
 0392
        nolink=FALSE
 Ø398
        nocomp=FALSE
        INPUT "What is the sourcefile pathname ",inpath$
 Ø39E
        INPUT "Which drive is the LIB directory include the slash",
 Ø3C6
         libdriv$
 9499
        INPUT "options", option$
        IF libdriv$-"/dg"
 94gF
 Ø41E
          whichdriv=TRUE
 Ø424
        ENDIF
 0426
        pointer=SUBSTR("0",option$)
 9432
        IF pointer ⋄ THEN
 Ø43E
          nopt=TRUE
 8444
        ENDIF
 9446
        pointer=SUBSTR("A", option$)
 Ø452
        IF pointer → Ø THEN
 045F
          noasm=TRUE
 Ø464
        ENDIF
 9466
        pointer=SUBSTR("L",option$)
 Ø472
        IF pointer ⋄ THEN
 Ø47E
          nolink=TRUE
 9484
        ENDIF
 Ø486
        pointer=SUBSTR(".",inpath$)
 0492
        ext$=RIGHT$(inpath$,1)
 949D
        inpath$=LEFT$(inpath$,pointer-1)
 94AC
        IF ext$="a" THEN
 Ø4B9
          noasm=FALSE
 Ø4BF
```

```
nopt=TRUE
Ø4C5
      ENDIF
G4CB
      IF extS="r" THEN
94CD
94DA
        nocomp-TRUE
        nopt=TRUE
84EB
        noasm-TRUE
Ø4E6
Q4EC
        nolink=FALSE
      ENDIF
04F2
      outpath$=inpath$+".com"
94F4
      CREATE #outp.outpath$: WRITE
0503
      outlinS="echo '"+inpath$+"."+ext$+"""
959F
      WRITE #outp,outlin$
Ø52C
      IF extS="a" THEN
Ø536
        outlin$="copy "+inpath$+"."+ext$+" temp.a"
0543
9565
        WRITE #outp, outlin$
956F
      IF extS="r" THEN
0571
        outlin$="copy "+inpath$+"."+ext$+" temp.r"
957E
g5Ag
        WRITE #outp, outlin$
Ø5AA
Ø5AC
      IF nocomp-FALSE THEN
Ø587
        outlins="-x"
asca.
        WRITE #outp.outlinS
        IF whichdriv-TRUE THEN
Ø5CA
Ø5D5
          outlin$="d.prep "+inpath$+".c >temp.m"
Ø5F4
95F8
          outlin$="C.PREP "+inpath$+".c >temp.m"
9617
        ENDIF
        WRITE #outp.outlin$
@619
        outlin$="x"
0623
Ø62B
        WRITE #outp,outlin$
        outlin$="echo c.passl"
@635
        WRITE #outp,outlin$
9648
Ø652
        outlins="C.PASS1 temp.m -o=temp.i"
0671
        WRITE #outp,outlin$
        outlin$="del temp.m"
Ø67B
Ø68C
        WRITE #outp.outlin$
0696
        outlin$="echo c.pass2"
GGAG
        WRITE #outp,outlin$
```

SDISK Sports New IBM PC Disk Transfer Program

I haven't heard from D. P. Johnson for more than a year now, but from what I've been reading, the author of SDISK is staying busy. He has a new package named PC-XFER available (\$45, 7655 S.W. Cedarcrest St., Portland, OR 97223, 503-244-8152) that you will find handy if you work with an IBM or clone at the office and need to carry text files home to your Color Computer.

Johnson's PCRead utility can read a file from an IBM PC single-sided disk of up to 40 tracks. The only restriction is the file you are copying off the IBM disk must be in the root directory. Conversely, his PCWrite utility writes a file into the root directory of an IBM disk so you can carry work you did at home back to the office.

The PCFormat utility will format a standard IBM single-sided disk. PCDe-lete will delete a file from an IBM disk. In addition to the IBM unique utilities, Johnson's PC-XFER package gives you utilities that read and write data from or to a standard 35-track Radio Shack

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2010 GREYHORSE DR. WAHRINGTON, PA 18976 PHONE: (215) 343-0423 disk. They use OS-9's standard input/output paths.

Johnson also throws in two utilities named addlf and striplf. The first adds line feeds behind every carriage return in the file. The latter does just the opposite. You'll find these two utilities handy if you transfer a lot of files between different computers because no two word processors write a file the same way. I use one of the generic transliterate utilities to do the job, but a dedicated utility would come in handy.

And while we're speaking of new software products from the Pacific Northwest, I hear that we can expect to see a full-blown relational database application language from a company named Clearbrook Software Group, Inc. (P. O. Box 8000-499, Sumas, WA 98295). Their package is named Solomon IMS. It reportedly features relational file access using a LINK command; multifield keys; text, integer, BCD and Date field and variable types; up to 16 files open at one time; field and record sizes limited only by your memory and OS-9; and an interactive programming environment.

```
Ø6B3
         outlin$="C.PASS2 temp.i -o=temp.a"
Ø6D2
         WRITE #outp, outlin$
Ø6DC
         outlin$="del temp.i"
Ø6ED
         WRITE #outp, outlin$
Ø6F7
       ENDIF
G6F9
      IF nont=FALSE THEN
9794
         outlin$="echo c.opt"
         WRITE #outp, outlin$
Ø715
         outlin$="C.OPT temp.a temp.o"
Ø71F
Ø739
         WRITE #outp, outlin$
Ø743
         outlin$="del temp.a"
0754
         WRITE #outp, outlin$
@75E
       ENDIF
9762
0764
       IF noasm-TRUE THEN
076F
      ELSE
0773
         outlin$="echo c.asm"
9784
         WRITE #outp, outlin$
         outlin$="C.ASM temp.o -o=temp.r"
Ø78E
Q7AB
         WRITE #outp,outlin$
         outlins-"del temp.o"
Q7B5
         WRITE #outp, outlin$
Ø7C6
g7Dg
      ENDIF
97D2
       IF nolink=TRUE THEN
g7DD
         outlin$="rename temp.r "+inpath$+".r"
Ø7FB
         WRITE #outp, outlin$
9895
       ELSE
gag9
         outlinS="echo c.link"
Ø81B
         WRITE #outp.outlins
9825
         IF whichdriv-TRUE THEN
GB3G
           outlin$="G.LINK /dg/CLIB/cstart.r temp.r -o="+inpath$+" -l=/dg/CLIB/clib.1"
9874
9878
           outlins="G.LINK /dl/LIB/cstart.r temp.r -o="+inpath$+" -1=/dl/LIB/clib.1"
Ø8BA
         ENDIF
Ø8BC
         WRITE #outp, outlin$
         outlins-"del temp.r'
GRCS
G8D7
         WRITE #outp.outlins
       ENDIE
GSE1
98E3 19 CLOSE #outp
GSEC
       END
```

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". . . a new package named PC-XFER is available that you will find handy if you work with an IBM or clone at the office and need to carry text files home to your Color Computer."

T. "Wink" Wingender, a retired master chief radioman at Coast Guard Headquarters who works with Quick Label inventor Lee Scott, brought a package in for me to try one day last month. They've got a great idea! Different Quick Label kits are available for your floppy disks, audio or data cassettes, and Beta or VHS video cassettes.

```
Listing 2:
PROCEDURE primes2
 gaga
           DIM trial, number, factor: REAL
 pppf
           INPUT "Number? ", number
 0011
 ØØ21
           IF number<1 OR number > INT(number) THEN
 ØØ37
              PRINT "Must be a POSITIVE INTEGER!";
 0057
             RUN primes2
 995B
 ØØ5D
 ØØ5E
           PRINT "*** Finding PRIME factors ****
 9969
 9983
           trial:-2
 ØØ8B
           factor := number
 9993
           LOOP
 9995
              IF factor/trial=INT(factor/trial) AND trial number THEN
 ØØB3
                PRINT trial;
 ØØB9
                factor := factor/trial
 ØØC5
                IF trial<factor AND trial<number/2 THEN
 ØØC9
 00E2
                  IF trial<3 THEN
 GGEF
                     trial:=trial+1
 GGFB
                     trial:=trial+2
 GGFF
 Ø1ØB
                  ENDIF
 gigb
                ELSE
 Ø111
                  IF trial>factor/2 THEN
 9122
                     IF number=factor THEN
                       PRINT number; " is a PRIME number!";
 012F
 Ø14B
                       RUN primes2
 914F
 @153
                       PRINT
 Ø155
                       RUN primes2
 @159
                     ENDIF
 Ø15B
                  ENDIF
 Ø15D
                ENDIF
 Ø15F
              ENDIF
 9161
            ENDLOOP
 Ø165
            END
```

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r to look at, you hold up a printout that contains all 400 all lined up and easy to look at. Sound impossible? Not you have a worksheet that contains 40 - 10 character wide columns prints them out "side ways" down the page instead of across the page. Utilizing the SIDE WISE 0S9 reads ASCII stored worksheets from your spreadsheet program and Okidata and Gemini Now, instead of having C-Itoh, per row. most Radio Shack, Epson. to 189 of 400 characters printers. SIDE WISE OS9 will print from 48. The output of SIDE WISE OS9 can also be separate sheets of paper to characters by 50 rows — all I with SIDE WISE OS9! That's a total s capability sibe wise o 50 rows. graphics printers.

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251

All kits include 24 labels and 24 overlays with one "Quik-Pen." Your first step with the Quick Label System is to stick the label itself — with any permanent information typed or written on it — on your floppy disk. Then, stick one of the overlays on the label. You can write anything you want on the overlay. The temporary label stays there until you rub it off with a moist cloth. Each time you initialize the disk and start over, you can change the label. Slick!

Any Ham Radio Programs Available?

Richard L. King, Jr., WB9RLG (hangs out around 3.907 MHz between 7 - 9 p.m., daily), P. O. Box 236, St. Bernice, Ind., has a question for fellow hams. Are there any OS-9 or BASIC09 programs for ham radio use? King is looking for log programs, as well as RTTY or CW simulators. If you know of any, let us know and we'll pass the word in this column.

How to Register Your Radio Shack Software

Here's a tip that comes in handy at RAINBOWfest and other computer shows. Instead of taking the time to fill out all those registration forms by hand, bring a number of those handy stick-on address labels to the show with you. Then when you want to register for the door prize at a booth, you can slap on a sticker instead of wasting the time to write your complete name, address and phone number.

I often carry this timesaving strategy one step further and use the stick-on address labels when I fill out software registration forms and warranty applications. However, it backfired the last time I sent one of those handy software registration postcards back to Tandy in Fort Worth. Usually, they have the

```
Listing 3:
PROCEDURE QPrime
 gggg
           DIM trial, end_trial: INTEGER; number: REAL
 0011
           PRINT
 9913
           INPUT "Number to test: ".number
           end trial:=INT(SQRT(number))
 ØØ2B
 9936
           IF MOD(number, 2) = THEN
             PRINT number; " is not a prime numer, divisor=2"
 9947
 GGE
             RUN QPrime
 ØØ73
           ENDIF
 9975
           FOR trial=3 TO end trial STEP 2
 ØØ8B
             IF MOD(number, trial)=Ø THEN
 ØØ9D
               PRINT number; " is not a prime number, divisor="; trial
 ØØC9
               RUN QPrime
 ØØCD
             ENDIF
 ØØCF
           NEXT trial
           PRINT number; "is a prime number"
 ØØDA
           RUN QPrime
 ggF3
 99F7
           END
Listing 4:
PROCEDURE primes
 9999
           DIM trial, number, factor: REAL
 ØØØF
           DIM clearscreen:STRING[1]
 ØØ1B
           clearscreen:=CHR$(12) \( * Match code with your terminal here *)
 994B
           PRINT clearscreen
           PRINT "PRIMES.
 9959
 9966
           PRINT "ADAPTED FOR BASIC 9 BY JOEL SHERMAN"
           PRINT "RE-ADAPTED FOR BASIC99 BY STEVE GOLDBERG"
 gg8D
 ØØB9
           PRINT
 ØØBB
           PRINT "To exit PRIMES, enter 9 as our choice of number."
 ggef
           LOOP
 ggF1
             LOOP
 ggF3
               PRINT \ PRINT
                INPUT "Enter a number: ", number
 ØØF7
 Ø1ØF
                IF number=@ THEN
 Ø11C
                 PRINT clearscreen
 Ø121
                 END
 @123
               ENDIF
 @125
             EXITIF number>9 AND number=INT(number) THEN
 Ø13B
             ENDEXIT
 Ø13F
               PRINT
 9141
               PRINT "Must be a Positive Integer!"
 9169
             ENDLOOP
 Ø164
             PRINT
 Ø166
             trial:=2
 Ø16E
             factor:=number
 Ø176
             REPEAT
 Ø178
                WHILE factor/trial=INT(factor/trial) AND trial number DO
 Ø196
                  PRINT trial;
 Ø19C
                  factor=factor/trial
 Ø1A8
                ENDWHILE
 ØLAC
                IF trial<3 THEN
 Ø1 B9
                  trial=trial+1
 Ø1C5
                ELSE
 Ø109
                  trial=trial+2
 @1D5
                ENDIF
```

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D.P. Johnson, 7655 S.W. Cedarcrest St. Portland, OR 97223 (503) 244-8152

(For best service call between 9-11 AM Pacific Time.)
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MS-DOS is a trademark of Microsoft, Inc.

```
Ø1D7
             UNTIL trial>factor OR trial>number/2
 GIEF
            - IF number=factor THEN
 ØlfC
              PRINT number; " is a PRIME number!"
 9217
             FLSE
 Ø21B
              PRINT \ PRINT
              PRINT number; " is not a prime number!"
 Ø21F
 Ø23E
             ENDIE
9249
           ENDI-OOP
Listing 5:
PROCEDURE runprimes3
           DIM number: REAL
0000
 9997
           PRINT CHR$(12) \(* clear the screen *)
 0022
           LOOP
 0024
             PRINT
 ØØ26
             LOOP
               INPUT " number? ", number
 0028
 ØØ39
             EXITIF number>1 AND number=INT(number) THEN
 GG4F
             ENDEXTT
               PRINT "Must be a positive integer"
 ØØ53
 9971
               PRINT "greater than 1!"
             ENDLOOP
 9984
 ØØ88
             RUN primes3(number)
 9992
           ENDLOOP
 9996
           END
PROCEDURE primes3
 gggg
           PARAM number: REAL
 0007
           DIM trial, factor, quotient, root: REAL
 ØØIA
 ØØ1B
           root:=INT(SQRT(number))
 ØØ25
           factor:=number
 ØØ2D
           trial:=2
 9935
           REPEAT
 9937
 0039
               quotient:=factor/trial
 8945
             EXITIF quotient >INT (quotient) THEN
 9953
             ENDEXIT
 0057
             PRINT trial: " ":
 ØØ61
               factor := quotient
 ØØ69
             ENDLOOP
 ØØ6D
 gg6E
             IF trial-2 THEN
 дд7В
               trial:=3
 0083
             ELSE
 9987
               trial:=trial+2
 9993
             ENDIF
 0095
           UNTIL trial>root OR trial>factor
 ØØA9
           IF factor=number OR number=2 THEN
 GGAA
 ggbf
             PRINT " --- prime number!"
 ØØD5
           FISE
             IF factor ◇1 THEN
 ØØD9
 ØØE6
               PRINT factor
 GGEB
             FLSE
 ØØEF
               PRINT
 ggF1
             ENDIF
 ØØF3
           ENDIF
 ggF5
           END
 Listing Diff
                                                       gggg27AC
                                    Bytes compared:
  Differences
                                    Bytes different:
                                                       ggggggg5
 byte
          #1 #2
 ggggggD 63 64
 @@@@135D 31 3@
 gggg136g 64 63
 ØØØØ27A9
           2A 8F
 @@@@27AA E9 D5
 999927AB AD 77
 Listing Diffl
                    000027AC
 Bytes compared:
 Bytes different:
  Differences
         #1 #2
 byte
 gggggggD 63 64
 9999135D 31 39
 000027A9 2A A7
  ØØØØ27AA E9 D6
 999927AB AD FD
```

catalog number of the software you are registering and the version number already pre-stamped on the cards. Big companies usually know how to save time, too!

As it happened, this particular card didn't have the Catalog Number stamped on the card. In my haste to slap on the stick-on label and get the card in the mail, I didn't notice the missing number. As a result, I got a nice letter from Norma Alexander in the Software Registration Department at Tandy. She explained how to register software when you lose the registration card or it is missing from your manual. I thought I should share the three methods with you. They are:

- Send a copy of the receipt showing the original purchase with the stock number indicated.
- Send the original title page from the software manual. It will be returned to you.
- Ask for written verification at the store where you purchased the item.

Be sure to include the stock number and version number for each item you are registering. If you have any problems or questions about software registration, you may write Norma in care of the Software Registration Department, P.O. Box 2910, Fort Worth, TX 76113-2910, or you may call her at (817) 870-0407.

Next Month — A DynaCalc Tutorial

In the November issue we hope to present a tutorial on *DynaCalc*. We've been talking about the need for application programs long enough — it's time to show off an excellent one. Joe Turner at Computer Systems Center in Chesterfield, Mo., has given us a few tips and is letting us use some sample spreadsheets available to the SS-50 crowd but not the CoCo owner.

We'll list several procedure files that extend the width of the original CoCo OS-9 DIR and MDIR utilities. The procedure files show how you can actually accomplish some programming tasks with the powerful OS-9 utility command set - right from the operating system command prompt. They were contributed by Donald L. McGarry of Northport, N.Y. We'll also give you our first reaction to three new programs — the OS-9 CBug Debugger, the OS-9 Text Formatter and the OS-9 Macro Assembler — that just arrived from Computerware in Encinitas, Calif. Till then, happy hacking!

THESE FINE STORES CARRY THE RAINBOW

The retail stores listed below carry THE RAINBOW on a regular basis and may have other products of interest to Tandy Color Computer users. We suggest you patronize those in your area.

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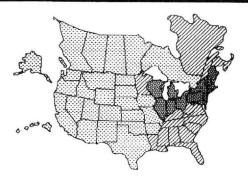
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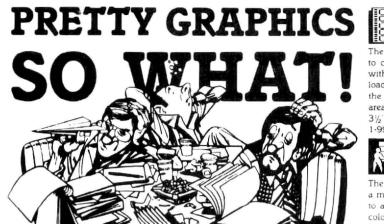
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SPECIAL EFFECTS

The special effects option allows the user to directly control the printing directives, ROTATION, X&Y SIZE, X/Y FLIP, X/Y GRID, X/Y FILL, TAB, WINDOW, POS/ NEG IMAGE, and more! With these, the user can print multi-page banners, change the grey levels used in color printing, rotate printouts 90, 180, or 270 degrees, stretch printouts horizontally or vertically, zoom in on small areas, superimpose vertical and/or horizontal grid lines with printouts for measurements and graphing, and much much more



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The disk option provides the user with access to standard 6K images, GRAPHI-COM and GRAPHICOM PART II files, and COCO MAX files too! "GALLERY" function allows viewing of all pictures on a disk Supports I to 4 disk drive system

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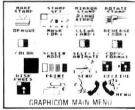
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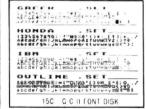
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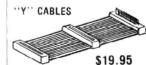
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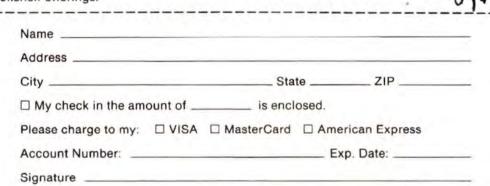
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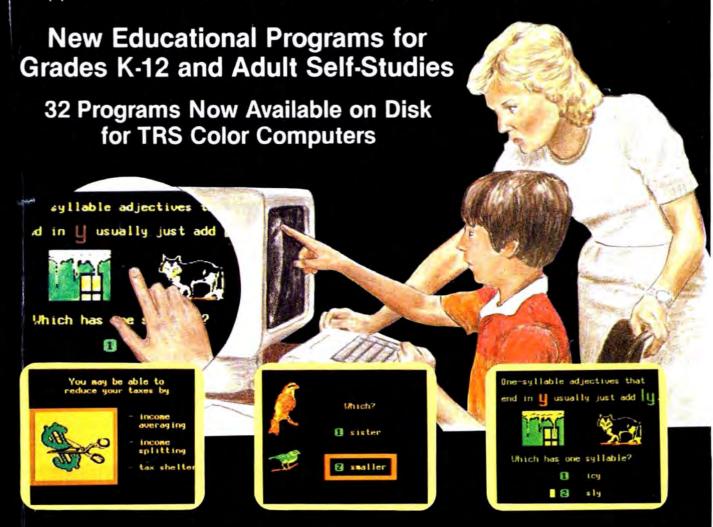
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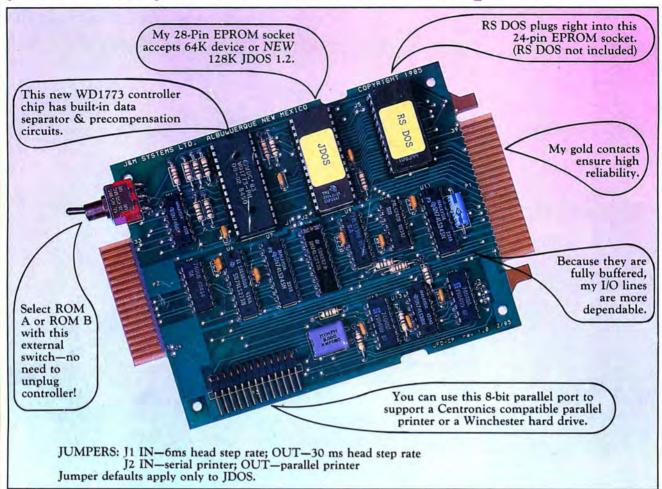






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